THE

AMERICAN REVIEW OF TUBERCULOSIS
ABSTRACTS OF TUBERCULOSIS

VOLUME XXVIII OCTOBER, 1933 ABST. NO. 3

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Nourishment of Heart in Tuberculous Myocarditis.—The heart of a 16-year-old boy is described in which an unusual degree of tuberculous fibrocaseous infiltration had destroyed the coronary arteries and the large surface veins. One-half to two-thirds of the right, and three-fourths of the outer portion of the left ventricular wall were destroyed by the caseous process. The wall of the right ventricle contained a great number of sinusoidal channels; relatively few were present in the muscle of the left ventricle. The sinusoidal spaces near the endocardium were on the whole more numerous and larger than those deep in the muscle. Their walls were likewise thicker and more highly organized, being composed of a relatively thick outer fibrous wall, lined by endothelium, while the smaller intramural ramifications often possessed a wall of no more than a single layer of endothelium. These thin-walled sinusoidal vessels could be traced from the endocardium to the large veins in the depth of the cardiac muscle, with which they communicated directly and freely. This sinusoidovenous circulation sufficiently nourished this small portion of the ventricular wall to support life for a relatively considerable period.—*Nourishment of the Myocardium through Thebesian Vessels in a Heart in Which the Large Coronary Arteries and Veins Were Destroyed by Tuberculous Myocarditis, S. Bellet, B. A. Gouley and T. M. McMillan, Arch. Int. Med., January, 1933, li, 112.*—(*W. I. W.*)

Tuberculosis of Duodenum.—This condition is relatively rare, for only 123 cases could be found in the literature. In all save one the lesion was ulcerative or caseous. The case of hyperplastic tuberculosis of the duodenum here reported is therefore the second to be recorded. A man of 57, with an indefinite history of thoracic disease 5 years before admission, complained of loss of weight and strength, a sense of fulness after meals, and repeated vomiting. The preoperative diagnosis was carcinoma of the stomach. A smooth firm mass, 4 by 3 cm., was found in the first portion of the duodenum. A resection of the first portion of the duodenum and the pyloric end of the stomach was done. The mass encroached on the lumen of the duodenum. Its cut-surface was whitish-pink and firm and appeared homogeneous. There was no gross ulceration, but slight erosion of the mucosa was present. Microscopically there was extensive infiltration by small round cells, which near the centre of the lesion crowded out the muscle fibres. Occasional multinucleated giant cells were found. One typical tubercle was located, but no tubercle bacilli could be found. There were similar but less extensive changes in the adjacent posterior wall of the stomach.—*Duodenal*

Tuberculosis, a Review of the Literature and Report of a Case of Hyperplastic Tuberculosis of the Duodenum, W. B. Matthews, P. A. Delaney and L. R. Dragstedt, Arch. Surg., December, 1932, xxv, 1055.—(R. D.)

Fusion of Tuberculous Hip-Joint.—Seventeen iliofemoroplastic operations, as described by Wilson, have led to uniformly good results. Four cannot be said to be completed cases, since the plaster dressings have not been removed, but complete ankylosis of the hip has been obtained in all others. The advantages which may be enumerated are that the operation takes little time, the hip-joint is not entered, and results are satisfactory. In this series there were no postoperative sinuses, no complications and no failures.—*A Report of Seventeen Cases of Tuberculosis of the Hip fused by the Wilson Method, L. Alpert, J. Bone & Joint Surg., January, 1933, xv, 48.—(J. F. B.)*

Fusion of Tuberculous Hip-Joint.—The more recent writings on the treatment of tuberculosis of the hip-joint tend toward surgical fusion. A healed tuberculous joint will not permit a useful range of motion. The author described the first iliofemoroplasty in 1927. The operation is not a bone-grafting one, for the distal end of the flap maintains its blood-supply. Although the joint capsule is opened, the joint surfaces are not invaded. The present report is made upon 33 cases and is offered as a preliminary report, since the number of patients is small and end-results cannot be stated for another ten or fifteen years. The operation is suitable for any child with tuberculosis of the hip-joint. Abscesses with or without sinuses do not constitute contraindications. The steps of the operation are given in detail which is easily followed. The operation is not technically difficult. Postoperative convalescence does not differ from that in other bone or joint operations. Dressings should be prepared at the time of operation. Discharges from existing sinuses should not come in contact with the operative wound. A double spica is used for hip-fixation until union is clinically firm. Fairly complete and detailed analysis of the reported 33 cases follows.—*Operative Fixation of Tuberculous Hips in Children, J. C. Wilson, J. Bone & Joint Surg., January, 1933, xv, 22.—(J. F. B.)*

Arthrodoesis for Tuberculosis of Hip-Joint.—Experience with 37 cases affords a basis for comparison between the intra-articular and the extraarticular types of operations, as well as a combined operation with removal of tuberculous tissue and the use of a bone graft. End-results are reported in 35 cases. Outlines of the various steps of the different operations indicate the operation of choice in each individual case. Thirty-two of 35 patients in this series obtained bony ankylosis. Drainage was less in those cases in which the tuberculous tissue was as cleanly removed as possible. More uniformly successful results are obtained by the use of the combined method of intraarticular and extraarticular operation together, with bone-graft, than by any other method. —*Combined Intra-articular and Extra-articular Arthrodesis for Tuberculosis of the Hip-Joint, M. S. Henderson, Journ. Bone & Joint Surg., January, 1933, xv, 51.—(J. F. B.)*

Osteitis Tuberculosa Multiplex Cystica.—One case of this rare disease is reported in great detail. This seems to be the first in which the long bones were affected. A review of the literature is given.—*Osteitis Tuberculosa Multiplex Cystica, G. S. Van Alstyne and G. H. Gowen, J. Bone & Joint Surg., January, 1933, xv, 193.—(J. F. B.)*

Renal Tuberculosis.—Tuberculosis of the kidney and of the genital organs is of haematogenous origin. Its primary focus is usually in the respiratory or gastrointestinal tract. Coalescence of tubercles is the rule, with caseation of the central portion and with extension of the margins until a large portion of kidney tissue is destroyed, including one or more papillae, with erosion and ulceration into a calyx. When erosion and ulceration into the calyx occurs, the irritating material is poured into the calyces and pelvis of the kidney. An acute irritation is set up in the kidney, to be followed by an extension downward into the ureter and bladder. At this stage of the disease the symptoms of frequency (dysuria, pyuria and haematuria) occur. Roentgen examination in renal tuberculosis includes the taking of plain films and pyelography. The earliest recognizable roentgen finding in renal tuberculosis is the alteration in the outer margin of a minor calyx. The involvement of the tip of the papilla, which lies in the cup of the calyx, produces the characteristic fringing of the outer margin of the calyx. Fringing, as revealed in pyelograms, never occurs until the tuberculous ulceration has extended into the papillae and eroded into the calyces. Severe renal, ureteral or vesical spasm and recent haematuria are complications which must be constantly borne in mind in arriving at the correct interpretation of the roentgen findings. In this series of 35 cases, 70 per cent were diagnosed by pyelographic studies. Forty per cent of the cases of known renal tuberculosis showed areas of cortical calcification in the plain film. The direct smear

yielded only 55 per cent diagnostic accuracy, and the guinea-pig inoculations yielded positive evidence in the other 45 per cent.—*The Value of Roentgen Ray in the Diagnosis of Renal Tuberculosis, C. A. Waters, Am. J. Roentgenol. & Rad. Ther., January, 1933, xxix, 17.*—(*W. I. W.*)

Renal Tuberculosis in Childhood.—Although renal tuberculosis is not common in children, the author has found it to be the underlying lesion in about 1.5 per cent of cases of chronic pyelitis. Six cases (aged 3 to 17 years) are reported. In unilateral lesions early nephrectomy, with proper postoperative care, results in complete cure in about half the cases. This emphasizes the importance of complete urological examination in children with pyuria persisting longer than 4 weeks despite intensive medical treatment. Other symptoms are disturbances of urination, and at times pain or haematuria. Diagnostic procedures should include cystoscopy, pyelography, and a search for tubercle bacilli in the stained urinary sediment or by guinea-pig inoculation.—*Renal Tuberculosis in Juveniles, Meredith F. Campbell, Am. J. Dis. Child., March, 1933, xlv, 555.*—(*M. D.*)

Excretory Bacilluria and Renal Tuberculosis.—Although not infallible, the biological test is still the best means of detecting the presence of tubercle bacilli in the urine. The literature reveals a lack of agreement as to the significance of tubercle bacilluria. The urines of 76 patients suffering from advanced pulmonary tuberculosis, with no obvious signs or symptoms of genitourinary involvement, were tested biclogically. With the exception of one all the specimens were negative. The microörganisms demonstrated in this case were of the human type. Biological tests on the blood were negative. Repeated examinations of this patient's urine were made. Several months later albumin, casts, and leucocytes became evident. These observations suggest that the presence of tubercle bacilli in the urine may often be the first sign of renal tuberculosis. The number of bacilli present depends more on the site than the size of the lesion. In this series of cases no definite evidence of excretory bacilluria was found.—*Excretory Bacilluria in Relation to the Diagnosis of Renal Tuberculosis, J. Menton, Brit. M. J., November 26, 1932, no. 3751, 965.*—(*T.O. R.*)

Benign and Malignant Tumors Associated with Renal Tuberculosis.—The history, laboratory, physical, cystoscopic and operative findings of a patient indicated a diagnosis of kidney tumor and renal tuberculosis. Nephrectomy showed the left renal pelvis filled with a papillary carcinoma, in addition to three caseous tuberculous cavities. The patient was a laboratory technician who had been working with avian tuberculosis but his renal infection proved to be of the human type. Following nephrectomy, benign papillomata appeared in the ureteral stump and in the bladder. These were removed. The right kidney appeared normal. Follow-up examinations and time will demonstrate the ultimate termination of this case.—*Benign and Malignant Tumors of the Kidney Associated with Renal Tuberculosis, J. M. Meredith, Am. J. Surg., February, 1933, xix, 329.*—(*J. F. B.*)

Addison's Disease with Atrophy of Adrenal Cortex.—Five cases of Addison's disease are reported, in which the adrenal cortex was found at autopsy to be affected more or less selectively by a destructive process which was evidently nontuberculous. Four of these cases were treated with extracts of suprarenal cortex. All of them showed more or less complete "atrophy" of the adrenal cortex. The destructive process in the adrenal glands consisted of a progressive necrosis of cortical cells with collapse of the stroma. In two cases there was a regeneration of cortical tissue. The medulla was affected to a much lesser degree, usually showing only a slight increase in the density of the fibrous framework and some shrinkage of the medullary cells. Lymphocytic infiltrations were constantly present in the adrenal medulla and among the remnants of the cortical tissue. Lymphocytic infiltrations in the thyroid gland and the kidneys constituted the most constant findings in association with adrenal lesions. Marked hyperplasia of lymphoid tissue was not present in any of the cases. No lesions were found for which the treatment with extract of adrenal cortex could be held responsible. The cause of these lesions is quite unknown. There was no evidence that tuberculosis played a part in any of these cases. The cellular picture was not characteristic of a chronic inflammatory reaction. In none of the cases were the adrenal vessels narrowed or occluded, and it is quite evident that the process was not one of true atrophy. On the other hand, all the evidence is consistent with the conception that some destructive agent, acting more or less specifically on the adrenal cortex, was responsible for necrosis of cortical cells, a process which continued in spite of regenerative efforts until the surviving cortical tissue was too scanty in amount to support life. A brief account is given of observations upon 4 cases, which showed the early stages of destruction of the adrenal cortex but which presented no clinical evidence of Addison's

disease. The lesions in these cases differed in no essential respect from those found in the cases of Addison's disease, except in point of degree. The findings indicate clearly that the primary lesion is in the adrenal cortex. Reproductions of photomicrographs accompany the article.—*Five Cases of Addison's Disease with So-Called Atrophy of the Adrenal Cortex, G. L. Duff and C. Bernstein, Bull. Johns Hopkins Hosp., January, 1933, lii, 67.—(J. S. W.)*

Pathogenesis of Tuberculous Meningitis.—Acute diffuse tuberculous meningitis is characterized especially by its exudative inflammatory nature, and by the tendency to widespread necrosis of the inflammatory exudate and of contiguous meningeal tissues. Such an extensive inflammatory reaction is considered to be an expression of the allergic state developing only in a person carrying an older sensitizing infection somewhere in the body. The problem discussed in the present paper is the mechanism by which the tubercle bacilli are deposited in the meninges in number sufficient to call forth such an allergic reaction. Most cases are still regarded as resulting from direct meningeal infection by way of the blood-stream, appearing usually as a part of the widespread dissemination of bacilli throughout the body during the septicaemia responsible for miliary tuberculosis, especially since tuberculous meningitis and miliary tuberculosis frequently occur together. It is therefore generally assumed that tubercle bacilli circulating in the blood-stream can readily lodge in the meninges in numbers sufficient to call forth the familiar diffuse inflammatory-necrotic reaction. But it is a familiar fact that meningitis may be absent in the most extreme cases of miliary tuberculosis in which every susceptible organ is riddled with tuberculosis, and this has been seen to occur in individuals who still had a high degree of allergy as determined by tuberculin tests. Again the writers have frequently observed that the age and character of the miliary tubercles in the viscera of patients dying with miliary tuberculosis and tuberculous meningitis may not correspond at all with the age and character of the meningitis, a point which speaks strongly against the contemporaneous origin of the meningitis and the miliary tuberculosis. In most cases the visceral tubercles are clearly much older than the fresh meningitis, while in other cases only minute fresh tubercles are found in the viscera in association with a chronic, fibrinous meningitis. Finally, there are many cases in which meningitis occurs in the complete absence of miliary tuberculosis. It has been noted that the experimental injection in animals of even massive doses of tubercle bacilli in the blood-stream, while causing a severe generalized miliary tuberculosis, has not produced a simultaneous, acute, exudative meningitis; indeed, not even when actual emboli of bacilli were introduced directly into the carotid artery. Direct infection of the meninges has always to be performed in order to produce the desired lesion. Since acute tuberculous meningitis has all the characteristics of an allergic reaction and such extensive reactions cannot be initiated by a few bacilli, the question is asked whether it is to be expected that great numbers of bacilli will be deposited in the meninges during the septicaemia of miliary tuberculosis. All experimental work points to the contrary. The distribution of tubercles in miliary tuberculosis follows very closely, indeed, the early distribution of inert particulate matter introduced into the blood-stream, and it has been shown that the piaärachnoid must be grouped with such tissues as the heart, the pancreas, and the thyroid, which stop and hold only relatively minute amounts of any circulating particulate matter. At the most, in cases of extreme miliary tuberculosis without diffuse meningitis a minute search will reveal only a few sparsely scattered tubercles in the meninges of the same general size and character as those found in the viscera. To produce a diffuse, acute, inflammatory-necrotic tuberculous reaction, really considerable numbers of bacilli or necrotic tissue saturated with their products must be discharged into the meningeal spaces. *Experimental Studies*: The first experiment was an effort to determine at the outset whether or not bacilli introduced into the blood-stream of an allergic animal would tend to lodge in the meninges, or to escape into the subarachnoid space in sufficient numbers to cause exudative meningitis. Previous investigators utilized only normal, nonallergic animals. Twenty allergic animals and 20 nonallergic (normal controls) were used. Half of these animals were rabbits and half guinea pigs. The rabbits were sensitized by subcutaneous inoculation with the H37 human strain, and the guinea pigs with the R1 human strain of low virulence. All animals of the allergic group gave strongly positive skin reactions to 5 mgm. of tuberculin before being used for the experiment. The rabbits were then injected intravenously with large doses of virulent bovine (B1) bacilli and the guinea pigs received many H37 human bacilli. Animals were killed at weekly intervals during six weeks. In only two animals did anything develop even remotely suggestive of exudative meningitis, although all showed more or less extensive visceral miliary tuberculosis. The meningeal lesion in the two animals consisted

only of the presence of a fresh scattering of mononuclear cells in the subarachnoid space. In another experiment two highly allergic rabbits and two normal controls were given repeated injections of bovine bacilli. At autopsy all four animals had an extreme visceral miliary tuberculosis but no meningitis, grossly or microscopically. Finally, 4.5 cc. of a cloudy suspension of virulent bovine bacilli was injected directly into the carotid artery of each of two allergic and two normal rabbits. At autopsy the meninges of all were grossly and microscopically normal. Likewise three allergic and three normal guinea pigs each received 1.5 cc. of a heavy suspension of virulent human bacilli *via* the carotid artery. Except for rare minute, discrete tubercles, the meninges of all were normal grossly and microscopically at autopsy. The viscera of animals surviving five days or more contained many miliary tubercles. Thus, in 54 animals, half of which were allergic, in no instance did a diffuse exudative meningitis follow directly the vascular injection of large numbers of tubercle bacilli. A meningitis, resulting at once from a direct haematogenous meningeal infection and appearing contemporaneously with the miliary tuberculosis caused by the injection, did not occur. Cases which develop some weeks after the injection are not, therefore, the direct result of injected bacilli escaping from the blood-stream, but rather a later and fortuitous result of the discharge of bacilli from an adjacent tuberculous focus produced by the injection. In human tuberculous meningitis there exists a very definite tendency for the infection to be particularly severe in and about the walls of the meningeal arterioles. The intima may be infiltrated with mononuclear cells; the media and adventitia are frequently infected and may be completely caseous; or a perfectly normal vessel may be completely surrounded by a sheath of inflammatory cells with necrosis which encroaches upon the adventitia only. This vascular involvement is regarded by many as evidence that the bacilli reach the meninges through the walls of the small vessels from the blood-stream. To test this hypothesis, allergic and normal rabbits were infected with heavy doses of tubercle bacilli by way of the optic foramen. The animals were killed at various intervals between forty-eight hours and twenty-five days. The character of the lesions resulting had all the distinctive characteristics of human tuberculous meningitis. The lesions appeared earlier in the allergic animals than in the controls. It was of particular interest that, just as in the case of human tuberculous meningitis, the bacilli showed a marked tendency to settle about the small meningeal vessels, and the accumulation of cells in and about the walls of these vessels was identical with that which, in the human being, has been regarded as evidence of infection of the meninges by way of the blood-stream. The above considerations cast grave doubt on the immediate haematogenous origin of tuberculous meningitis, and directed attention to the more probable origin from local tuberculous foci, older than the meningitis, which infect the adjacent meninges by discharging bacilli directly into them. A search was therefore made for such foci of origin in the material available from cases of human tuberculous meningitis. Most of the material consisted of brains hardened in formalin. Sometimes the entire spinal cord was available. The adjacent bones were only exceptionally preserved. *Results:* In the series (82 cases) there was only one case of tuberculous meningitis clearly arising from direct extension of infection from tuberculous vertebrae. In 17 cases meningeal plaques were found to be the sole origin of a fresh diffuse meningitis. These plaques are nothing more or less than solitary caseous tubercles of the meninges. Sometimes they are hidden in a sulcus and are found only when the brain is sectioned. They may be found well encapsulated and quiescent, in the absence of diffuse meningitis; or, spreading during a period of lowered resistance, they may discharge bacilli into the adjacent meninges and so become directly responsible for the development of diffuse meningitis. In 56 cases the meningitis occurred as an extension from caseous foci in the substance of the brain or spinal cord. The foci were most frequently situated in the temporal and parietal lobes and in the cerebellum, and less often in the frontal and occipital lobes. When meningitis was well established an accumulation of exudate was regularly found at the base of the brain. For a tuberculous focus to set up a diffuse meningitis bacilli must be discharged freely from the margin, and it is only a softened caseous margin, containing many bacilli, which is effective in establishing a diffuse and progressive meningitis. Usually such foci were not the larger masses, several centimetres in diameter, ordinarily well encapsulated, but they were the smaller freshly caseous foci, containing many bacilli, and arising near the meninges or ventricles and not old enough to be well encapsulated. Many of these foci were difficult to find. Eleven cases of miliary tuberculosis without tuberculous meningitis are reported in the series. In all except two of these cases tuberculous areas were discovered in the substance of the central nervous system but not in communication with the meninges, and in these two cases

encapsulated tuberculous foci were found in the meninges themselves. A heavy blood-stream infection is apparently not sufficient to produce tuberculous meningitis, even in the highly allergic individual. Bacilli do not stop in the meninges in sufficient number to produce more than rare discrete tubercles. It is obvious, however, that if the bacilli in any of these sparsely scattered miliary tubercles of the brain or meninges continue to proliferate, larger caseous foci may develop and later may feed their bacilli into the subarachnoid space and so establish a diffuse meningitis. The original cerebral localization of the tubercle bacilli may be the result of the early dissemination of bacilli which so commonly takes place during the primary infection, or the dissemination may occur as a result of reinfection. In progressive disease, a scattering of bacilli to distant organs by way of the blood-stream is exceedingly common. In early dissemination occurring during primary infection before there has been time for the development of acquired resistance, the scattered foci may enlarge progressively without any significant encapsulation, and give rise to most of the caseous foci which extend to infect the meninges in infancy and early childhood. It is also the case, that in progressive childhood disease, there will be more macroscopic caseous tubercles in the central nervous system than there will be in cases of reinfection in adult life, in which bacilli disseminated from the progressive lesions fall upon unfavorable soil because of the presence of resistance acquired during an earlier primary infection. It is clear that the development of meningitis is a fortuitous event, depending not upon the existence of miliary tuberculosis, but upon the chance extension of infection from an established caseous focus which happened to develop adjacent to the meninges or ventricles.—*The Pathogenesis of Tuberculous Meningitis, A. R. Rich and H. A. McCordock, Bull. Johns Hopkins Hosp., January 1933, lii, 5.—(J. S. W.)*

Treatment of Tuberculosis of Skin.—Olesen of Copenhagen has combined light treatment and diathermy with dietary treatment according to Sauerbruch. The method of the treatment which can be easily handled in an ambulatory fashion is as follows: The local lesions are cleansed with oil and ether, and are then treated with diathermy, producing microscopical sparks with the active electrode. This treatment is repeated if necessary after the reaction has subsided. For two days local treatment with the sollux lamp is given, directly following diathermy treatment. In the intervals the lesion is protected by some indifferent ointment. The diet is rich in vitamines, poor in animal protein, and is complemented by vigantol and calcium. This treatment gives very prompt and cosmetically most satisfactory results.—*Ambulatorische Behandlung der Hauttuberkulose durch Licht, Daithermie und Diät, S. C. Dalsgaard, Beitr. z. Klin. d. Tuberk., December, 1932, lxxxi, 774.—(M. P.)*

Action of Hydnocarpates and Morrhuates in Lupus.—A very resistant and extensive case of lupus vulgaris is reported which responded favorably to the intracutaneous injections of ester-morrhuates and hydnocarpates. A drop or two of ethyl-ester-morrhuate was injected at each sitting into the thickened margin of the lesion at several neighboring points. Different areas were selected at each weekly visit. Within about 2 weeks the original thickening of the treated areas showed definite reduction. Because the progress with the morrhuates was slow, the more active *ethyl-ester-hydnocarpate*, in the form of *moogrol*, combined with 4 per cent creosote as an antiseptic, was used. This was more effective in reducing the thickened areas. However, this administration was followed by the appearance of fresh ulceration in the older, uninjected, central parts of the lesion. Therefore, the use of the morrhuates was resumed. Healing was satisfactory. Because of the general beneficial effect of the hydnocarpates, this treatment was again continued alone. Improvement was rapid. At the end of a year the diseased areas had nearly all disappeared. The further trial of hydnocarpates in tuberculous disease appears to be indicated, but it should be used with caution in pulmonary cases, as it can produce both general febrile and focal reactions with softening of the tuberculous lesions. Previous experiments designed to test the inhibitive or bactericidal effects of chemotherapeutical preparations on the tubercle bacillus have been carried out by making surface cultures, and it was in an effort to obviate this possible source of error that Besredka's fluid egg-medium was used. The substances tested were *alepol* (B. W. and Co.), a preparation of sodium salts of a selected fraction of the lower melting-point fatty acids of hydnocarpus oil, and an emulsion of cod-liver-oil reduced to a very fine dispersion in saline solution. *Alepol* proved to possess marked growth-inhibiting properties *in vitro*. The fact that guinea pigs inoculated with cultures (in Besredka's fluid egg-medium containing *alepol* in a strength of 1 in 1,000,000) survived, suggests that this substance may have bactericidal properties. *Alepol* did not demonstrate any specific curative effect *in vivo*. However, this was incon-

clusive, because the untreated control rabbits exhibited a well-marked toleration for the culture of human tubercle bacilli used. Because of the marked antibacterial properties of *alepol* demonstrated *in vitro*, it may be found useful for sterilizing tuberculous pleural effusions or in the treatment of other closed spaces as cold abscesses which contain tubercle bacilli in their fluids.—*Observations on the Use of Hydnocarpates and Morrhuates Intradermally in Lupus Vulgaris, L. Rogers, with a Note on the Inhibitory Action of "Alepol" on the Growth of Tubercle Bacilli in Besredka's Fluid Egg Medium, S. L. Cummins and C. Weatherall, Brit. M. J., January 14, 1933, no. 3758, 47.*—(*T. O. R.*)

Immunobiology of Tuberculosis of Skin.—This study was made on 103 cases with various tuberculous skin affections, with the purpose of investigating the diagnostic and therapeutic value of tuberculin. The following tests were used: *1:* The intracutaneous with Old Tuberculin, in solutions 1:10,000 to 1:1,000,000, the three concentrations being injected simultaneously on the anterior surface of the leg with separate syringes and needles for each solution. Reactions which can be attributed to a residue of tuberculin from a higher concentration were thus avoided. *2:* The percutaneous test. In a number of cases dermotubin, a tuberculin ointment containing dead tubercle bacilli, was applied on small pads, which, covered with oilskin, were fastened to the skin with adhesive tape for twenty-four hours. In other instances the ointment was rubbed in, and in a third small group Hamburger's Percutantuberculin was used. The percutaneous reaction, always eczematoid in appearance, is first noticeable after twenty-four hours and becomes, as a rule, more pronounced on the second or third day. At first, small prominent itching nodules appear, to be followed later according to the degree of the reaction by vesicles with subsequent formation of pustules. The inflammatory symptoms gradually subside in five to eight days, but stronger reactions may last from two to three weeks and leave a more or less marked pigmentation accompanied by intense itching. A flaring-up of tuberculous foci or an old reaction could be observed if a higher dose of dermotubin was applied, but a general reaction occurred in only one instance. The histology of the percutaneous reaction was studied in several cases, and the changes on the tenth day are described as intercellular oedema, moderate hyperkeratosis of the epithelial cells, the papillary corpuscles and the subpapillary layers. The capillaries were dilated. The structure of an old reaction at the end of the fourth week resembles that of a tubercle. Of the entire group, 23 had lupus vulgaris, 15 lupus miliaris disseminatus, 2 tuberculosis verrucosa cutis, 10 other colliquative or ulcerative forms, 9 Bazin's indurative tuberculosis, 24 lupus erythematodes discoides and 5 granuloma annulare. All of the lupus vulgaris cases had a positive reaction to dermotubin if it was applied on pads, while the inunction method gave a negative result in 9 cases. The percentage of negative reactors to the weakest Old Tuberculin solution suggests a low degree of allergy in lupus vulgaris. With the use of stronger concentrations the number of positive reactions increased, but some cases proved refractory even to the solution, 1:10,000. A still lower degree of hypersensitiveness was found in lupus disseminatus miliaris, the tests with all methods being negative in the majority of cases. In the colliquative and ulcerative forms no reaction was elicited by small doses, and it required higher concentrations to produce positive results. The epidermal test gave a positive reaction in 70 per cent of patients but was negative in 3 cases of scrofuloderma. In the group of exanthematous forms the allergy varied considerably. All of the 10 cases of papulonecrotic tuberculides were anergic to the weakest Old Tuberculin solution; some reacted to higher doses, whereas in 3 instances both the intracutaneous and the percutaneous tests were negative. Contrast tests, done in healthy and diseased portions of the skin, suggested that the local allergy is markedly increased near a focus, and they are considered of diagnostic value. An exacerbation of the allergic response can be obtained also by sensitization with X- or *Grens*-rays, and most probably is of therapeutic significance. The passive transmission of hypersensitiveness, which was tried in 3 cases, was successful in one instance only. A high grade of allergy was found in the 9 cases of Bazin's disease. In the lupus-erythematodes group the reactions were rather irregular and a comparison of the various tests showed a discrepancy in the results. In all 24 cases, Loewenstein's technique was used to determine the presence of tubercle bacilli in the blood-stream with 5 positive blood-cultures. A low-grade allergy seems to be the rule in granuloma annulare; one patient, however, from whose blood positive cultures were obtained proved anergic to all tests. In order to investigate the specificity of the tuberculin reaction control examinations were made on 100 patients without skin affections or with diseases which are not considered tuberculous. Both the intracutaneous and the epidermal tests were without exception negative. Of the entire group of 103 patients with tuberculosis of

the skin, 5 per cent reacted to the weakest solution, 40 per cent to 1:100,000 and 69 to 1:10,000, while 70 per cent were positive to the dermotubin test. These figures fail to support the claim recently made by Nathan and Kallos that the epidermal test is strictly specific for tuberculosis of the skin. The investigations furthermore prove that the presence of tubercle bacilli in the bloodstream does not necessarily produce skin allergy, since among the 15 patients with positive cultures, 6 negative reactors were found. Vernes's floccualtion test was used with negative results in several cases. The high percentage of positive reactions suggests that tuberculin tests are specific and of diagnostic aid in tuberculosis of the skin, especially if both methods are employed simultaneously and if contrast reactions are made use of. Tuberculin is also of therapeutic value in some affections. The combination with light therapy, by which the allergic phenomena are increased in intensity, is recommended in lesions which are characterized by a low-grade allergy.—*Zur Immunbiologie der Hauttuberkulose, J. Konrad, Wien. klin. Wchnschr., September, 2, 9, 16, 1932, xlv, 1081.*—(*K. F.*)

Tuberculides.—In the present state of our knowledge, certain tuberculides may be safely designated as of strictly tuberculous origin. Others constitute syndromes which may appear in conjunction with other diseases but more commonly with tuberculosis. The treatment comprises general hygienic measures, codliver-oil with arsenic or strychnine, calcium, and in carefully chosen cases, iodine. Tuberculin is not advised.—*Le Tuberculidi, A. Masia, Tubercolosi, September, 1932, xxiv, 293.*—(*U. E. Z.*)

Thoracic Surgery.—In a series of two lectures the field of thoracic surgery is covered systematically, with discussions of displacement of the mediastinum, spontaneous pneumothorax, pleural effusion, empyema, suppuration of the lung, and collapse therapy, including artificial pneumothorax, oleothorax, thoracoplasty, phrenicectomy, scaleniotomy, and extrapleural pneumolysis with paraffin filling. It is stated that a tuberculous effusion may be sterilized by injecting, after aspiration, 5 or 10 cc. of a 2 per cent solution of methylene-blue in absolute alcohol. It is recommended that, if this fails, the effusion be replaced by olive-oil containing 5 per cent of oil of gomenol. The results of the operative procedures are not discussed statistically except in the case of scaleniotomy. Eleven cases had received this operation after phrenicectomy, and the impression is given that some benefit must be attributed to the scaleniotomy. Thoracoplasty is preferred to scaleniotomy or extrapleural pneumolysis, and is considered less of a risk than intrapleural pneumolysis in the face of multiple adhesions. A concluding plea is made for wider use of collapse therapy in Great Britain, since arrest of the disease may be secured in a considerable number of cases otherwise doomed to lingering illness and death.—*Thoracic Surgery, H. M. Davies, Lancet, March 4 & 11, 1933, ccxxiv, 455 & 511.*—(*R. D.*)

Collapse Therapy of Tuberculosis.—A study is presented of the relative applicability of the various surgical-collapse measures in the treatment of 420 patients with the adult type of pulmonary tuberculosis, consecutively admitted to the Michigan State Sanatorium. Of these, a total of 324, or 77.14 per cent, were selected for collapse therapy. Artificial pneumothorax was prescribed for 241 patients, or 57.38 per cent of the total (14 with bilateral pneumothorax) and phrenic-nerve surgery for 238, or 56.66 per cent; one hundred and seventy-eight of the latter had permanent nerve-interruption. Scaleniectomy was combined with phrenic surgery in 13 instances. The phrenic-nerve surgery in 156 cases was performed either in substitution for, or supplementary to artificial pneumothorax. In 75 cases (17.86 per cent) other types of surgery (intrapleural or extrapleural pneumolysis, thoracoplasty, etc.) supplemented either pneumothorax or phrenic surgery or both. On a different comparative basis, the 241 pneumothorax and 238 phrenic surgery recommendations represented 74.38 and 73.46 per cent, respectively, of the entire collapse-therapy group. There seems to be an increasing interest of the general practitioner in the application of surgery to tuberculosis, and an increasing interest also in the promotion of postgraduate instruction, particularly in the technique of pneumothorax therapy. This statistical study indicates that the majority, not the minority, of patients with active pulmonary tuberculosis are suitable for collapse therapy in some form, and that considerable involvement of the better lung even with cavities present, does not necessarily contraindicate such therapy. The point is stressed that such therapy should be considered from the standpoint of immediate application as soon as possible after a diagnosis is made, and should not depend upon delayed admission to institutions with long waiting lists.—*Collapse Measures for Pulmonary Tuberculosis: A Study of Their Relative Applicability, G. L. Leslie, J. Am. M. Ass., February 4, 1933, c, 313.*—(*G. L. L.*)

Collapse Therapy of Tuberculosis.—The authors present an analysis of the extent to which collapse therapy is employed in the treatment of pulmonary tuberculosis in the New England States. Returns from a questionnaire sent to all hospitals, thoracic surgeons, and specialists in diseases of the lungs in the New England states indicate that, of an estimated 22,110 active cases of pulmonary tuberculosis, only 928, or 4.2 per cent, were selected for some form of collapse therapy. In an attempt to obtain some opinion as to the percentage of tuberculosis patients amenable to such treatment, a questionnaire was also sent to numerous lung specialists and tuberculosis centres throughout the entire country, with the result that individual opinion varied in estimates of the indicated applicability of such measures, with only one or two exceptions, from 15 per cent to 57 per cent, the authors coming to the conclusion that 30 per cent was the figure that nearest represented the consensus of opinion of all these authorities. The authors recommend that (1) tuberculosis and its diagnosis and treatment should be given distinctly more attention in medical schools than is now the case; (2) every general hospital, large or small, should freely and willingly admit tuberculous patients for study, diagnosis and operative treatment, if necessary; (3) every tuberculosis hospital and sanatorium should have an X-ray plant or easy access to one and should be otherwise equipped to carry on compression treatment, while the members of its staff should be trained in the selection of cases and in the technique of pneumothorax; and (4) the subject should form part of the yearly program of every county and local medical society.—*Collapse Therapy of Pulmonary Tuberculosis in the New England States, J. B. Hawes, II, and M. J. Stone, J. Am. M. Ass., June 11, 1932, xcviii, 2048.*—(*G. L. L.*)

Surgical Treatment of Tuberculosis.—Thoracoplasty and phrenicectomy are established adjuncts to the treatment in selected cases of pulmonary tuberculosis. Positive sputum is the chief indication for thoracoplasty in patients otherwise suitable. Continuation of positive sputum after thoracoplasty indicates need of further collapse. The sputum may continue positive after complete collapse or become negative with incomplete collapse. In any case, the only criterion of a successful thoracoplasty is a living patient with continuously negative sputum. It is to be regretted that no facilities for thoracic surgery in either personnel or equipment exist in the great majority of public sanatoria. The state board of health, interested lay organizations, the county authorities and the directors of sanatoria should coöperate to provide surgical consultation and care for all indigent patients. It is suggested that each county or sanatorium make arrangements with the nearest general hospital to have one or more members of its staff, trained in chest surgery, see these cases at the discretion of the director. Phrenicectomy could be performed at the sanatorium, but for larger procedures, the patient should be moved to the hospital temporarily on a prearranged *per diem* basis. Preliminary to thoracoplasty the cardiorespiratory capacity should be studied. The only way to determine whether these patients can stand a major operation is to observe the effort syndrome. Before operation, one should get them out of bed daily, gradually increasing the time and amount of exercise. The length of time required for the return to normal should be noted. Cyanosis is a positive contraindication to surgery. The Wilms-Sauerbruch technique of paravertebral thoracoplasty in two stages is recommended, removing portions of 10 ribs, including the first, as close to the transverse processes as possible, taking the lower ribs at the first stage. The use of acacia instead of transfusion of blood is recommended to combat shock because of its safety, reliability and cheapness.—*Thoracoplasty in Pulmonary Tuberculosis, K. Dunham and E. Asbury, J. Am. M. Ass., July 30, 1932, xcix, 360.*—(*G. L. L.*)

Surgical Treatment of Pulmonary Tuberculosis.—We now possess efficient surgical means by which mechanical collapse of the diseased lung and cure of tuberculosis can be accomplished. Thoracic surgeons must have a thorough knowledge of physiology and the pathological physiology of respiration and circulation, as well as of the pathology and clinical evolution of pulmonary tuberculosis. There must be coöperation between the surgeon, the phthisiologist, the bronchoscopist, the roentgenologist and the pathologist. Although there can be no absolute classification of pulmonary tuberculosis, there are four main types which are recognized, namely: caseous-pneumonic, exudative, exudative-productive and chronic productive types. The caseous-pneumonic form of tuberculosis corresponds to the ulcerocaseous or fibrotic forms of different authors. This is the only type in which surgical treatment is indicated. More specifically the end-results of this type, the honeycombed lung or that with cavitation, afford the indications for surgical therapy. Pneumothorax produces collapse of the lung, not by compression, but because the lung is no longer forced to expand by negative intra-

pleural pressure. It is the most efficient means at our disposal for the collapsing of pulmonary cavities. Unless efficient selective collapse is obtained within two months, this method should be given up, for it can be both useless and dangerous. Pneumothorax should be avoided in very early cases. Nor should it be employed when the degree of destruction of the pulmonary parenchyma is such that there can be no reasonable hope for effective reëxpansion. Paralysis of the diaphragm is produced with certainty only by avulsion of the phrenic nerve. Phrenicectomy produces an immobilized diaphragm in an elevated position, loss of its tonus, and muscular atrophy. The degree of elevation depends upon the difference between intrathoracic and intraäbdominal pressures. In fibrotic tuberculosis the diaphragm may rise considerably, being aspirated into the thoracic cavity because of the lowering of the intrathoracic pressure due to lung contraction. The elevation is less in more nearly normal or healthy lungs. It is an open question whether fibrosis of the tuberculous lung and cure of the disease are the result or cause of the rising of the diaphragm. It is inadmissible that an inert membrane such as a denervated diaphragm, can play any active rôle in its own elevation and we must look elsewhere to justify the possible usefulness of this operation. Phrenicectomy produces but slight decrease in the capacity of the chest equal to a pneumothorax not exceeding 200 or 300 cc. of air. Obviously it cannot give an effective degree of collapse. The only method by which closure of a cavity can be produced, by phrenicectomy, would be by kinking the drainage bronchus of the cavity and absorption of the air in the cavity. Immobilization of the lung cannot be produced by phrenicectomy unless the intercostal nerves have already been paralyzed. But phrenicectomy used with other operations, such as thoracoplasty, is useful, provided too much is not expected from it. Intrapleural pneumolysis is a useful procedure in selected cases. Adhesions which are thin, long and avascular may be severed with the electric cautery, and the patient be distinctly benefited by the additional collapse. The sectioning of adhesions between ligatures after thoracotomy is conceded to be a more dangerous method. Extrapleural pneumolysis is more efficient and more promising. There are three types of operation which may be classed under this subhead, namely, extrapleural apicolysis, scalenectomy and complete resection of the first two or three ribs. Apicolysis consists in stripping the parietal pleura of the apex from the chest-wall and filling the space with fat, pedunculated muscle flaps or a combined paraffin and bismuth paste. Scalenectomy consists of division of the clavicular portion of the sternomastoid muscle, both scalene muscles and complete resection of the first rib. The approach is made anteriorly and there is no necessity of any filling or paste. The third procedure, complete resection of the first two or three ribs by a paravertebral approach, is in reality a partial upper thoracoplasty. All of the author's 16 cases who were given this type of operation have shown marked improvement. In 3 cases pedunculated muscle-flaps and gauze were used to fill the cavity left by the collapsed lung and in the others Baer's paste was employed. The complications of this method are (1) suppuration due to the paste and its elimination; (2) perforation of the roof of the cavity, and (3) forcing of adhesions by the weight of the paste and migration of it lower into the chest. The author has had no cases with serious suppuration, but 3 cases had discharging fistulae for several months. This procedure is a real advance in the treatment of apical cavities and bilateral lesions, and is less serious but also less efficient than upper-stage thoracoplasty. Multiple intercostal neurectomy, as devised by Alexander, combined with phrenicectomy assures good immobilization of the chest. It does not produce adequate collapse, however, and its field is limited to those cases in which nothing more can be done. Paravertebral thoracoplasty is the last procedure for surgical collapse of the lung. The first rib should be entirely removed and paravertebral segments of 10 to 15 cm. of each of the other ribs resected. The degree of collapse depends upon the length of the resected segments. Usually two or more stages of the operation are employed. The indications for thoracoplasty may be summarized as a patient with unilateral caseous-pneumonic tuberculosis, afebrile, in relatively good condition and upon whom pneumothorax was impossible or inefficient, whose diseased lung should have the tendency to retraction, whose weight is stationary or increasing, and who has rather moderate expectoration of positive sputum. Patients with some contralateral disease and some toxemia are fair to bad risks. Patients should also have some measure of resistance to tuberculosis. Although there is no clinical method for its estimation, patients are accepted for the operation who present little or moderate increased respiratory rate after exercise, haemoglobin above 70 per cent, pulse below 100, and integrity of the kidneys and gastrointestinal tract. Tuberculous laryngitis, slight gastrointestinal tuberculosis and haemoptysis are not contraindications. Results from thoracoplasty are gratifying. In 72 cases in this series there was a mor-

tality of 16 per cent, but 76 per cent of the patients became and remained bacilli-free. The principal causes of postoperative mortality are aspiration pneumonia, heart-failure, shock, and wound-infection. Wound-infection can be controlled by faultless technique and team-work. Shock can be reduced by the selection of patients. Cardiac failure and aspiration pneumonia are the two most important complications. Because they are closely interrelated and are probably due to bronchial plugging by aspirated material, they can be practically eliminated. General anaesthesia (nitrous oxide and oxygen, together with small amounts of ether) is administered through an intratracheal catheter. The catheter is introduced into the trachea under local anaesthesia and the pharynx is tightly packed with gauze. Pneumonostomy and pneumonectomy are infrequently-used procedures and therefore are not discussed at length. Serous or purulent pleural fluid containing only tubercle bacilli should not be removed frequently. Thoracoplasty should be employed for longstanding tuberculous empyemata. Mixed empyemata according to the degree of infection may be treated with gomenol or dye solutions. Later, closed drainage should follow, and thoracoplasty if the lung does not reëxpand. Putrid empyema demands immediate drainage. The prognosis in septic cases is serious and in putrid empyema almost always fatal. *Present Status of Surgical Treatment in Pulmonary Tuberculosis, P. N. Coryllos, Am. J. Surg., December, 1932, xviii, 494.—(J. F. B.)*

Final Results of Surgery in Pulmonary Tuberculosis.—The late results obtained by various methods of thoracoplasty over a period of twelve years are critically reviewed. The most important contraindications, such as myocardial damage, caseous infiltrations, multiple involvement of other organs or of both kidneys, severe intestinal tuberculosis, amyloidosis, emphysema of the contralateral lung and the age limit of sixty years are briefly discussed, and the importance of selecting the most opportune time for surgery is emphasized. It is pointed out that the patients who were referred for surgery were not always good risks and that the results, while satisfactory, could be considerably improved by a better selection of cases. The postoperative mortality for 253 cases that are considered in this study was 19 per cent, the late death-rate 25 per cent; of the surviving 152 patients, 42 per cent are classified as cured, 16 per cent as improved, and 12 per cent as not improved. During the first postoperative week the most frequent cause of death is cardiac decompensation (64 per cent) while later pulmonary complications are responsible for 72.5 per cent of all deaths against 26.5 per cent caused by cardiac failure. The markedly higher postoperative mortality in right-sided cases, especially if the first stage is done at the base, is, according to Sauerbruch, explained by the compression of the right auricle and the vena cava. Progressive pulmonary tuberculosis, mostly on the contralateral side, is the cause of failure in over 60 per cent during the first two years after operation. Tables, which demonstrate the effect of thoracoplastic operations after two, five and eight years, show that the results are uniformly good if the patient survives the first two critical years. In the two-year group 48 patients (63 per cent) were found cured against 69 per cent cures in both the five- and eight-year group. While age, the condition of the patient and of his cardiovascular system are to be considered the main factors which decide the postoperative mortality, extension and progrediency of the pulmonary disease constitute the most frequent cause of the late death-rate. The extent and uniformity of the collapse obtained by the thoracoplastic operation is of the greatest importance. Unfavorable late results can often be attributed to an insufficient collapse. In these cases a supplementary operation should be performed near the cavity which has remained patent. In order to obliterate cavities which had not been completely closed by previous operations, 18 patients were reoperated on, of whom four are cured since more than four years and four longer than eight years. In circumscribed lesions of the upper lobe a partial upper thoracoplasty with or without phrenicectomy is considered preferable to an apicolysis with plombage. The disadvantages of the latter method, such as secondary infections, displacement of rigid cavities or shifting of the tampon and particularly the perforation of the cavity-wall, are obvious and the late results of extrapleural pneumolysis with the use of plastic material are in fact not satisfactory. Of 30 patients in whom the closure of cavities by apicolysis was attempted nine died and only four are reported as cured and the same number as improved. Reactivation of the pulmonary process was observed more frequently after plombing than after thoracoplasty. Phrenicectomy as a procedure preliminary to more radical surgery is of value but is not necessary in all cases. The opinions on the value of phrenicectomy as an independent operation are still divided. *—Ueber Dauerresultate der operativen Behandlung der Lungentuberkulose, W. Denk, Wien. klin. Wchnschr., November 18, 1932, vi, 1433.—(K. F.)*

Surgical Closure of Tuberculous Cavities.—Small, soft-walled cavities can often be closed by such procedures as phrenicectomy, partial pneumothorax, a small extrapleural pneumolysis, or a small paravertebral thoracoplasty, or by combinations of these procedures, but large or thick-walled cavities may require more strenuous efforts at compression. When dealing with such cavities one is rarely fortunate enough to find a fixed mediastinum and a free pleural space. When other methods fail, extensive thoracoplasty may be found necessary. In preference to the one-stage operations of Sauerbruch and Brauer, the author performs thoracoplasty in several stages (three or four or more at intervals of two weeks) and removes large portions of ribs. Adequate exposure, not only for the subscapular ribs, but for the first rib as well, is obtained by dividing the serratus magnus. By this method, 10 cm. or more of the first rib can be removed. Parasternal chondrectomy, under local anesthesia, as advocated by Gale, preliminary to paravertebral thoracoplasty, was very successful in the one case in which it was tried in producing a greater degree of collapse. Following the failure of a paravertebral thoracoplasty to close an upper-lobe cavity, other measures may become necessary; of these an early anterolateral thoracoplasty is to be preferred to the plan of waiting six or eight months or to the use of extrapleural pneumolysis. If one delays the anterior operation, regeneration of ribs at the site of the previous paravertebral thoracoplasty will interfere with complete collapse; for this reason, the anterolateral thoracoplasty is performed after the upper two stages are done, and as many subsequent posterior resections are performed as found necessary, the intervals between operations being two weeks. In the performance of an anterolateral thoracoplasty, the second rib is resected, then the first, and then if necessary the third. The first rib anteriorly is rendered accessible by raising the patient's arm; because of the proximity of the large subclavian vessels great care is necessary in removal of this rib. The anterior rib-resection extends from the site of the posterior resection to the medial ends of the ribs, including the cartilages, and if necessary even portions of the sternum. Following operation, the pressure of the dressings is gradually increased, and these are later replaced by a special brace with a rubber-sponge pad, to be worn for three months. The operation results in an ugly deformity, but the results indicate its usefulness. In a group of about 100 cases of posterior thoracoplasty, it was necessary to resort to the anterolateral operation in fourteen, in ten of which complete closure of cavities was effected. One patient in this series died. In three cases small cavities persisted; all of these were done before the importance of doing the anterior operation before posterior rib regeneration occurred was realized.—*Special Considerations Relating to Surgical Closure of Large Upper Lobe Tuberculous Cavities, J. Alexander, J. Thorac. Surg., October, 1932, ii, 1.*—(*B. B.*)

Treatment of Cavities.—The three stages of tuberculosis of the lung are infiltration, caseation and excavation. Prognosis depends on the degree of activity and not on the presence or absence of cavities. An acute tuberculous bronchopneumonia without cavity may have a worse prognosis than third-stage disease with cavity. Clinically three types of cavity are recognized: (1) the recent cavity with a ragged wall of necrotic tissue; (2) the cavity lined with a fibrotic wall, but containing pus; and (3) the dry cavity with a firm fibrotic wall. The so-called roentgenographic annular shadows must be considered cavities until proved otherwise. The presence of such a shadow in the absence of clinical symptoms and physical signs is not an indication for collapse therapy. The dry cavity with firm fibrotic wall does not respond well to collapse therapy and these cases do very well without such treatment. Experience teaches that life is prolonged by artificial pneumothorax in the early infiltrative and subacute fibrocaseous stages of tuberculosis of the lung, but that it is shortened by pneumothorax in the chronic fibrotic stage. The presence of a free pleura cannot be determined by X-ray and the only reliable test is needle-puncture. When pneumothorax is inapplicable, sand-bags on the chest should be used to supplement bed-rest. A weight of 40 pounds is not uncommon, and in one case the weight reached 82 pounds, applied at short intervals. *Conclusions: 1:* A tuberculous cavity in the lung is a potential danger. The danger may be great or small. *2:* Treatment of a cavity is not without danger, which is slight in some cases, great in others. *3:* The patient should not be exposed to treatment which is more dangerous than the cavity. *4:* The annular shadow often shown by radioscopic examination of tuberculous lungs is probably due to a cavity in the majority of cases. In the absence of any symptoms or signs other than those of radioscopy, this type of cavity is not an indication for any special treatment. *5:* A dry cavity in a chronic fibrotic case is best treated by the same means as a chronic fibrotic case without cavity. Attempts to close the cavity by pneumothorax or thoracoplasty are usually unsuccessful and often

shorten the life of the patient. *6:* When a cavity is accompanied by much expectoration, special treatment is indicated, because the disease is very likely to spread and the prognosis is bad. Artificial pneumothorax should be tried first, and adhesions divided if necessary. Failing this, phrenic avulsion and thoracoplasty or apicolysis may be tried, but, if these methods are contraindicated, the lung should be rested by the application of sand-bags to the chest wall. Apicolysis is more successful than a partial thoracoplasty. *7:* In the acute case with cavity-formation, artificial pneumothorax is the best treatment. Failing this, the lung should be rested by sand-bags. Phrenic avulsion and thoracoplasty are contraindicated.—*The Treatment of Tuberculous Cavities of the Lung, L. S. T. Barrell, Lancet, February 18, 1933, ccxxiv, 356.*—(*B. T. McM.*)

Treatment of Cavities.—Rest is utilized to see what the patient can do with small cavities or honeycombed areas. Enough cavities heal spontaneously to warrant this expectant treatment for a period not to exceed three months. Then, if healing is not taking place, some form of compression therapy should be instituted. Phrenicectomy is indicated for small, round, thin-walled cavities, wherever situated. Should this operation not be sufficient to bring about cavity-closure, artificial pneumothorax may be attempted. In the majority of cases pneumothorax gives by far the most satisfactory form of compression therapy. It is the method of choice when phrenicectomy fails and when there are multiple cavities or large thick-walled cavities. Of those who had complete compression by pneumothorax there were 53 per cent well and 24 per cent dead. Of those with partial compression there were 25 per cent well and 44 per cent dead. Of those cases with no free pleural space there were 16 per cent well and 60 per cent dead. Other figures are given to indicate that compression therapy results in healing of cavities in 57 per cent of cases, while the maximum from bed-rest alone is, according to Fales and Beaudet, 40 per cent. Intrapleural pneumolysis should be attempted, when, after 2 to 3 months of therapeutic pneumothorax, cavity-closure has not been obtained because of adhesions. Extrapleural pneumolysis is applicable to cavities situated in the upper third of the lung where adhesions cannot be burned. Everything possible should be done before resorting to thoracoplasty, because tuberculosis patients are at best poor risks for major surgery. It is emphasized that the man who temporizes with tuberculosis to-day and who treats advanced disease by bed-rest alone, and the usual routine of 25 years ago, failing to utilize the methods of collapse therapy at his command, is a menace to his patients and is not giving the best the profession has to offer in the treatment of this disease.—*The Treatment of Cavities in Pulmonary Tuberculosis, L. S. Peters, Ann. Int. Med., December, 1932, vi, 802.*—(*E. H. K.*)

Subcostal Compression of Lung.—Subcostal compression of the lung is recommended, both for collapse of apical cavities and for bronchiectasis and lung abscess, when extrapleural compression is desired. By the method described for apical cavities an anterior approach is made; the second and, if necessary, the third rib is dissected from its intercostal tendons with the knife; the dome of the lung is freed by finger dissection; and the space is packed with masses of paraffin inserted between the ribs. Sauerbruch's method, resection of the third rib posteriorly, may be better for large posterior cavities; the author's method has the advantages of being easier, less bloody, and less destructive. It is especially in cases of bronchiectasis and lung abscess that this method has application, since the rib-cage remains intact and there is no interference with the highly important cough-reflex. This relatively simple procedure of subcostal compression by paraffin or gauze does not complicate the later performance of other more radical operations. The method has been successfully used in 11 cases of apical compression and in several cases in which a large area of a lower lobe was compressed with gauze preparatory to a cautery pneumotomy.—*Subcostal Extrapleural Compression of the Lung, L. Eloesser, J. Thorac. Surg., August, 1932, i, 672.*—(*B. B.*)

Artificial-Pneumothorax Statistics.—Artificial pneumothorax is one of the most hopeful and beneficial methods used in the treatment of pulmonary tuberculosis. A survey has been made of a series of cases treated by artificial pneumothorax from 1922 to 1928. All patients had tubercle bacilli in the sputum before treatment and very few were early cases. Pneumothorax was attempted in 149 cases, out of which 102 were successful. Seventy-five per cent of the patients were between the ages of fifteen and twenty years. Of the successful pneumothorax patients, 29.4 per cent are still alive, while only 1.06 per cent of the unsuccessful ones are alive. It is impossible to compare accurately these cases with ordinary sputum-positive patients, but there is no doubt that this therapy produces almost immediate benefit.—*A Review of Artificial*

Pneumothorax Cases, G. Hurrell, Tubercle, September, 1932, xiii, 542.—(M. E. P.)

Cavity in Artificial Pneumothorax.—In many cases of artificial pneumothorax instituted primarily to close cavities it not infrequently happens that adhesions between the pleural surfaces prevent the satisfactory collapse of these cavities. There are some physicians who believe that almost all adhesions should be severed; on the other hand, a satisfactory collapse will often be obtained in spite of numerous adhesions by pneumothorax alone if continued for a sufficient length of time. Soon after starting pneumothorax, adhesions may become visible by X-ray, but many of these will often disappear as the treatment is continued. It is important to differentiate between those adhesions which prevent collapse of a cavity and those whose presence is relatively innocuous. Phrenicectomy will often release the tension of a taut adhesion sufficiently to permit closure of the cavity. In a study of 250 cases of artificial pneumothorax, after a few months of treatment only 20 cases were found in which pneumolysis might be considered advisable, and after 8 months only 6 cases remained in which it was felt that pneumolysis was indicated. In two hospitals giving over two thousand refills a month, it was found necessary to perform pneumolysis for adhesions in only 16 patients during the last five years. This incidence of pneumolysis is considerably lower than in many other clinics. Of the two methods of open operation the author prefers that of rib resection and incision of the pleura rather than the method of Jacobaeus. The details of this operation are described; its significant details include a three-inch incision through skin and fascia, usually over the second rib anteriorly, removal of 2 or 3 cm. of rib, and an incision through the periosteum and pleura about 0.75 inch. Good visibility is obtained by a Cameron light, which by being placed behind the adhesion can demonstrate pulmonary cavitation extending out into the adhesion and, in addition, large vessels in the adhesion. The adhesions are cut by cautery or ligated between two clamps. The advantages of this operation include increased accessibility of adhesions, the decreased danger of haemorrhage, and the ability to avoid cutting into a cavity in the adhesion. Using this small opening into the pleura which is easily and tightly closed, the difficulties of continuing pneumothorax, encountered in other operations in which larger openings are made, are obviated.—*The Suspended Cavity in Artificial Pneumothorax, E. J. O'Brien, J. Thorac. Surg., August, 1932, i, 603.—(B. B.)*

Effects of Artificial Pneumothorax on Contralateral Lesions.—Forlanini stated that when a therapeutic pneumothorax is instituted for the treatment of serious tuberculous disease in one lung, active but less extensive foci in the opposite lung often show distinct improvement. It is believed by some that indirect though partial compression of the contralateral lung, brought about by displacement of the mediastinum, is partly responsible for the regression of the lesions. The disintoxication of the patient, resulting from the compression of the more extensive and active foci, increases the disease-resisting powers of the body, so that it is better able to heal the smaller lesions in the noncollapsed lung. This same explanation would apply to the evident betterment occurring in extrapulmonary lesions in patients undergoing pneumothorax therapy. It is an accepted teaching by some observers that artificial pneumothorax induces a sort of gradual and long-continued vaccination, capable of stimulating the specific defensive forces against tuberculosis.—*A proposto dell'azione del pnx terapeutico sulle lesioni ulcerative controlaterali, R. Vercesi, Lotta contro la tubercolosi, October, 1932, iii, no. 10, 1095.—(U. E. Z.)*

Selective Artificial Pneumothorax. Of 65 patients in whom thoracoplasty was performed, 19 presented the roentgenological appearances of a selective pneumothorax. In 7 of these cases, the reasons for this apparent selective pneumothorax could be ascertained. They showed an adhesion, either from the obliterated lobar fissure or from the apex of the free lower lobe, to the thoracic wall. It is concluded that what appears as selective pneumothorax is frequently only an incomplete collapse due to adhesions.—*Thorakoskopiebefunde beim Selectiv-pneumothorax, Gudehus, Beitr. z. Klin. d. Tuberk., November, 1932, lxxxi, 613.—(M. P.)*

Artificial Pneumothorax in Childhood.—It is asserted that collapse therapy is incontestably the most efficacious aid, entailing no significant dangers or risks, in the treatment of pulmonary tuberculosis in childhood. An ulcerocaseous lesion is an absolute indication for this procedure. In very young infants this type of lesion is rare, but, when it does occur, cavitation is so common that pneumothorax should be instituted without delay. Epituberculosis, however, which occasionally spontaneously retrogresses, may be expectantly observed for several weeks or months. Continued loss of weight, extension of the roentgenographic shadows, appearance of adventitious breath-sounds, or continued presence of bacilli in the gastric

contents are indications for intervention. It must be noted, however, that bacilli often first appear following the collapse. These statements are based on a series of 120 cases treated by pneumothorax. Twenty-four unilateral collapses were established in infants, and 18 good results were obtained. Fifty-seven unilateral and twenty-seven bilateral collapses were instituted in older children, and 54 and 17 good results, respectively, were secured. The follow-up period was one to four years. Thirty-eight effusions occurred, 21 of which have persisted. In those cases in which pneumothorax was not successful, oleothorax, phrenicectomy, or aurotherapy were resorted to, often successfully.—*Remarques sur une statistique de 120 cas de pneumothorax artificiel chez l'enfant tuberculeux, P. Armand-Delille, G. Hechter and A. Magrin, Rev. d. l. Tuberc., July, 1932, xiii, 763.*—(*A. E. M.*)

Aspiration Artificial Pneumothorax.—Sorgo had recently advocated a technique for the institution of artificial pneumothorax and for refills by which the air is allowed to be sucked in by the negative pressure in the pleural cavity, mainly for the purpose of preventing bulging of the mediastinum. Morelli to whom priority belongs had devised his method during the war for the treatment of haemothorax and for the management of pulmonary haemorrhages following trauma.—*Ueber Aspirationspneumothorax, J. Sorgo, Wien. Klin. Wchnschr., October 14, 1932, xlv, 1290.*—(*K. F.*)

Bilateral Artificial Pneumothorax.—The application of bilateral artificial pneumothorax on a wider scale is advocated. Selective collapse of the diseased areas of the lung, while permitting function of the healthier portions, is the procedure of choice. Adhesions mitigate against this procedure more than any other factor, and cauterization of adhesions is indicated when possible. When it is probable that a cauterization will enable the healthier parts of the lung to attain a better function and will secure more ideal conditions for a gradual reëxpansion of the affected parts, cauterization is indicated, even if the artificial pneumothorax has been clinically successful. In limited disease the complete thoracoplasty now in vogue should give way to partial thoracoplasty or apicolysis. In bilateral artificial pneumothorax needles with side openings should not be used, as they are more apt to perforate the lung than the ordinary needles. Combinations of methods may be desirable, such as phrenicectomy or plombage or partial thoracoplasty on one side and pneumothorax on the other. A bilateral phrenicectomy has been carried out with relatively good result and without any serious disturbance of function. A case of bilateral thoracoplasty is reported. The patient, a young girl, was febrile for 18 months prior to the operation, but has remained afebrile ever since. The expectoration, which was rather copious in amount, decreased to about 10 cc. in 24 hours but was still positive for tubercle bacilli.—*Selective Lung Collapse in Bilateral Disease, J. Gravesen, Lancet, February 18, 1933, ccxxiv, 354.*—(*B. T. McM.*)

Bilateral Artificial Pneumothorax.—In many cases in which a bilateral pneumothorax is indicated, a unilateral pleural symphysis prevents realization of this procedure. In such cases a contralateral phrenicectomy should be considered in preference to continuing with a unilateral pneumothorax. Elective collapse by phrenicectomy is possible if the diseased portions of the lung are capable of spontaneous retraction. Five cases are presented in which satisfactory results were obtained by combining phrenicectomy with a contralateral pneumothorax or oleothorax, a convenient procedure which is technically easy of execution.—*La collapsothérapie bilatérale par le pneumothorax d'un coté et la phrénicectomie de l'autre, L. Daniello and M. Alexandrov, Rev. d. l. Tuberc., October, 1932, xiii, 835.*—(*A. E. M.*)

Simultaneous Bilateral Pneumothorax.—Twelve cases of pulmonary tuberculosis in which simultaneous bilateral pneumothorax was instituted are reported in detail. None of the pneumothoraces were inaugurated coincidently. The shortest interval between the initial and contralateral collapse was six weeks. The intervals between reinsufflations were 5 to 8 days at first and subsequently never exceeded 15 days. Alternate insufflations were preferred, although occasionally a too-rapid expansion of the lung necessitated simultaneous ones. The terminal pressures were uniformly negative intentionally, and all the collapses were selective and of varying degrees. In 10 cases the results were eminently satisfactory and in 2 cases unsatisfactory. There were no immediate accidents at the inception of the pneumothoraces, but in 3 cases effusive pleurisies occurred later. Each of these had significant adhesions which probably had been ruptured. The combined experience suggests the following views: Bilateral localized ulcerative processes are the indication *par excellence* for immediate intervention. The earliest possible intervention obviates the formation of large adhesions, and secures more adequate retraction before circumfocal organization is far advanced. Localized infiltrative

processes are not as reliable a guide and may be observed longer as these forms occasionally regress spontaneously. Although animal experimentation has indicated that one-sixth the normal pulmonary area is sufficient to sustain life, clinical experience empirically indicates that about one-half the pulmonary field must be functionally viable for adequate oxygenation. This arbitrary limit also ensures a modicum of reserve for emergency demands, such as an effusion might impose. If less than one-half of the pulmonary field appears normal, a contralateral collapse should not be attempted. Pleuropulmonary ruptures with subsequent effusions are much feared accidents, which Bernard early emphasized. However, they are probably no higher in incidence in bilateral than in unilateral pneumothoraces, although in the former the symptomatology is more striking. The rarity of this accident in this series is explained by the earliness of the intervention, before the lesion had progressed far enough peripherally to set up subpleural tubercles with overlying adhesions, the rupture of which is the feared eventuality. Also the terminal pressures were subatmospheric in each instance. Adequate collapse is a function not of the pressures used, but of the retractability or nonretractability of the diseased tissue. The possibility of realizing a selective collapse is conditioned by the extent of the lesion and the earliness of the intervention which in turn determines the presence or absence of significant adhesions. The obtaining of a selective collapse is of first importance in bilateral collapse therapy, as it alone ensures adequate oxygenation and diminishes the immediate and late risks. It is concluded that in this series of cases the earliness of the interventions, the selectivity of the collapses, and the favorable results obtained are more than a coincidence.—*Collapsus électif et pneumothorax bilatéralisé simultané. Ulceration et zone d'infiltration bacillifère, localisées, dans les indications de la double collapsothérapie, U. Guinard, Rev. d. l. Tuberc., July, 1932, xiii, 681.*—(*A. E. M.*)

Fixation of Mediastinum.—In artificial pneumothorax, in thoracoplasty and in plombage the importance of a fixed mediastinum cannot be overemphasized, not only with regard to the efficacy of these procedures but also because of some of the dangers inherent to such procedures of collapse therapy, such as acute cardiac failure and aspiration pneumonia. In the anterior mediastinum, at the site of the atrophied thymus, is located the "weak spot" of the mediastinum, and it is here that most of the mediastinal herniations from artificial pneumothorax occur. In order to find substances that would meet the requirements for artificially fixing the mediastinum several requirements had to be fulfilled. The substance would have to be inert, so that an acute inflammatory reaction would not result; the duration of fixation would have to be variable so that either a short-lived fixation could be attained, as would be required for open pneumothorax or a permanent fixation could be obtained by some material which would effect an innocuous chronic inflammatory reaction. Rabbits were used in these experiments and various substances were tried with all of which complete mediastinal fixation could be obtained. Acacia in a 30 per cent solution was absorbed in 36 hours; agar remained at least 2½ months; paraffin oil alone or with admixtures of silicon dioxide or silicates resulted in variable degrees of chronic productive inflammation, with complete and permanent mediastinal fixation. The degree of fixation was tested by the injection of 20 cc. of air into the left pleural sac which, in the presence of a normal mediastinum, would produce marked mediastinal displacement in rabbits. In 6 human fresh cadavers complete fixation was obtained by injections of acacia or paraffin oil into the anterior mediastinum and the anterior portion of the superior mediastinum. Amounts varying from 75 cc. in infants to 250 cc. in adults were used; the sites of injection were in the left 6th interspace and over the superior margin of the manubrium, in each case care being taken to hug the sternum closely. In one living patient acacia was injected into the mediastinum without harmful effect in order to prove its innocuousness; in this instance the fixating effect was not determined.—*Experimental Fixation of the Mediastinum, M. Berck, J. Thorac. Surg., October, 1932, ii, 44.*—(*B. B.*)

Mediastinal Hernia in Artificial Pneumothorax.—In pneumothorax treatment there may occur a total parallel or a circular displacement of the mediastinum, but still more frequently there is a partial displacement at the least resistant places of this structure. There is an upper, anterior area of thin, "less resistant" pleura behind the sternum at the level of the first to the third rib, where so-called mediastinal hernia may be observed. There is likewise a lower, posterior "less resistant" area between the heart and the spinal column. Mediastinal displacements are caused not so much by the positive pressure of the pneumothorax as by the elastic pull of the contralateral lung. Respiration is also responsible for mediastinal displacement through the respiratory motion of the diaphragm. This movement is toward the pneumothorax side on inspiration and

toward the contralateral side on expiration. A serious degree of mediastinal flutter may be present in high pleural pressures, and here the mediastinum moves to the healthy side on inspiration and to the pneumothorax side on expiration. Each pulmonary collapse means a certain impairment in the efficiency of cardiac diastole which is increased with the increase in the displacement of the mediastinum. A yielding mediastinum often prevents an effective collapse and a contralateral pneumothorax, even on a healthy side, may be indicated. Dangerous results, especially of a circulatory nature, may occur in a yielding mediastinum in pneumothorax therapy, if the contralateral lung shows evidence of shrinking, because then the mediastinum may be pulled too much to this side. —*Die Bedeutung eines nachgiebigen Mediastinums für die Pneumothoraxbehandlung, H. Alexander, Deutsche med. Wchnschr., August 26, 1932, lviii, 1351.*—(*H. S. W.*)

Pleural Effusions in Artificial Pneumothorax.—This is a summary of 248 pleural effusions from 202 female patients, with a total of 211 pneumothoraces, collected during the years 1926 to 1930. It is concluded that these effusions are of inflammatory nature and of specific aetiology. In almost all cases the pleura is involved in the form of adhesions. The occurrence of effusions is less frequent in cases with broad and short adhesions, particularly when these are localized over the mediastinal and basal surfaces. It is likely that the mechanical tension on adhesions plays an important rôle in the pathogenesis of effusions. No definite factor could be accused as a regular cause for effusions, but it appears likely that there is some relation to the amount of involvement in the contralateral lung. In bilateral pneumothorax effusions are strikingly rare. Definite relations between effusions and climatic factors could not be established, but there is a suggestive dependence on changeable and unseasonal weather. Of 211 pneumothoraces, 27 per cent never showed an effusion, 43.6 per cent showed only small effusions in the costodiaphragmatic angle, and 29.4 per cent showed massive effusions.—*Über Ergüsse beim künstlichen Pneumothorax. I. Grundsätzliches über Registrierung und Statistik eines Pneumothoraxmaterials. Zur Genese der Pneumothoraxergüsse, sowie deren Beziehungen zu besonderen Faktoren im Befund und Behandlungsverlauf, O. F. Haarer, Beitr. z. Klin. d. Tuberk., November, 1932, lxxxi, 459.*—(*M. P.*)

Contralateral Exudates in Artificial Pneumothorax.—The occurrence of a contralateral pleural effusion during treatment with artificial pneumothorax is comparatively rare. It is usually observed within the first six months of treatment and most commonly in patients with artificial pneumothorax on the right side. In many cases the contralateral lung appears free from tuberculous disease on clinical and radiological examination. In two-thirds of the cases an effusion coexists on the collapsed side. The mode of onset, symptomatology, and amount and character of fluid is no different than that observed in ordinary exudative pleurisy. In half of the cases the fluid absorbs spontaneously with no ill effects. In the majority of patients this complication is simply the expression of pleural involvement due to reactivation of old preëxisting foci or to the development of new lesions. There is no evidence definitely pointing to the pneumothorax as a cause. A haematogenous dissemination in the form of a polyserositis has been the causative factor in some cases. That it may be an allergic manifestation is another theoretical cause, ascribed by many to the effusions ordinarily developing during artificial pneumothorax.—*La pleurite essudativa controlaterale nel corso del pneumotorace terapeutico, C. Luzzato Fegiz, Lotta contro la Tubercolosi, August, 1932, iii, 850.*—(*U. E. Z.*)

Expansion of Lung after Artificial Pneumothorax.—There have been very few reports on the status of patients in whom artificial pneumothorax has been stopped. In a series of 105 former pneumothorax cases, in which the lung had been reëxpanded from one to eighteen years, 81 patients were alive and of these 62 were leading normal lives. Twenty-four patients were dead, and 19 of those living were still "curing." Most of the cases in this study were in the far-advanced group, and all but 25 had lesions in the other lung. A positive sputum was present in 98 cases, and 75 of these became negative after pneumothorax treatment. In the patients who are living and well, pneumothorax treatment had closed the cavities and rendered the sputum negative; of those still curing the cavities had not been closed, or extension had occurred to the other lung, or the patients were still recovering from other surgical procedures. In a group of 38 patients, who had returned to work after reëxpansion of the lung, only 3 had relapses in that lung. The former cavity reappeared 3 years after treatment had been stopped in one case; in another case an acute tuberculous process developed in the other lung, followed by cavity-development in the lung which had been originally collapsed, although this new cavity did not appear at the site of the old lesion; in the third case, the cavity reap-

peared seven years after cessation of pneumothorax. In another group of 34 patients who returned to work, there were five who relapsed, but the details of the relapses were not known. The total number of relapses in 72 patients who had returned to work was ten, and all of these occurred from 3 to 11 years after pneumothorax was stopped. The average time that pneumothorax was maintained in the 105 cases was 2.6 years. It is concluded that reactivation following satisfactory collapse is the exception rather than the rule, and that an effective pneumothorax of two year's duration, with a negative sputum for at least one year, gives reasonable assurance that the lung may be expanded with safety. Even in those cases in which the pneumothorax is unintentionally lost at the end of 2 years there is no more danger of reactivation, if the cavity has been closed and the sputum rendered negative, than if the collapse were maintained for longer periods.—*The Present Status of One Hundred Pneumothorax Patients after from One to Eighteen Years' Expansion of the Lung, E. N. Packard, J. Thorac. Surg., August, 1932, i, 581.*—(*B. B.*)

Termination of Artificial Pneumothorax.—Whereas the indications are well recognized for the induction of pneumothorax in patients with pulmonary tuberculosis, the criteria for its release are less clearly defined. Seven factors are involved in the decision that the optimum time has been reached for reëxpansion of the collapsed lung: (1) the type of onset of the tuberculous disease, and its course prior to the giving of pneumothorax; (2) the period of time which has elapsed between attempting the pneumothorax, and producing a satisfactory collapse of the affected lung; (3) the rate of disappearance of tubercle bacilli from the sputum; (4) the existing constitutional symptomatology of the patient as compared with that before pneumothorax; (5) the type of refills; (6) the condition of the contralateral side; and (7) the economic status of the patient. Physical signs by themselves are relatively unimportant, because even a thin film of air may mask or distort marked pathological lesions in the underlying lung. On the other hand, serial X-ray plates, especially those taken just prior to the induction of the pneumothorax, and for two weeks thereafter, are particularly helpful in that they show the degree of parenchymal involvement before collapse therapy. Later X-ray plates may be misleading, as mediastinal structures may overshadow changes in the parenchyma of the lung. Of the seven factors listed, the time necessary for the disappearance of tubercle bacilli from the sputum constitutes the most important criterion as to the effectiveness of the pneumothorax. At the time of induction it is futile to estimate the necessary duration of the pneumothorax. Satisfactory pneumothorax for one year to one and a half years should be sought for. Occasionally shorter periods suffice, but far more often the clinical course necessitates a longer space of time. When release of the collapsed lung has been determined upon, the affected lung should be allowed to expand slowly and under careful observation. An average-sized pneumothorax should require two and a half to three months for complete reëxpansion of the collapsed lung. In instances in which air-absorption occurs too rapidly, the rate of expansion may be slowed by small refills; in reverse cases, the rate may be accelerated by putting the patient on graduated exercise. The reappearance of tubercle bacilli in the sputum, or the development of undesirable constitutional symptoms during the release of collapse therapy, are indications that pneumothorax should be maintained. In cases of large cavitation antedating the pneumothorax, a phrenicoexairesis is advised at the end of the period of pneumothorax before attempting a release of the collapsed lung. This measure is also advocated during release of the pneumothorax if untoward symptoms develop as a result of a shifting of the mediastinum.—*Ueber den Abschluss der Pneumothoraxbehandlung, M. Gross, München. med. Wchnschr., July 8, 1932, lxxix, 1122.*—(*V. T.*)

Reëstablishment of Artificial Pneumothorax.—A pneumothorax was reinstituted six years after its abandonment because of renewed activity of a pulmonary tuberculosis. The pneumothorax had previously been sustained for nine years. This observation is of interest because of its rarity.—*Reprise d'un pneumothorax abandonné depuis six ans, et créé quinze ans auparavant, C. Mantoux, Rev. d. l. Tuberc. July, 1932, xiii, 760.*—(*A. E. M.*)

Simultaneous Artificial Pneumothorax and Thoracoplasty.—Pneumothorax instituted for lesions in the upper lobes often results in incomplete collapses because of apical adhesions. Although satisfactory clinical results are nevertheless occasionally obtained if the adherent areas are limited in size or if the lesion is not strictly apical, more generally the ultimate results are not good. Renewed activity may appear at the level of the adhesions, or the more serious complication of pleuropulmonary rupture with septic pleurisy may occur. Such an incomplete collapse presents difficult problems in subsequent procedure. If an

apicolysis is not feasible, one might abandon the pneumothorax and resort to other surgical methods. However, this entails certain dangers. Decompression, especially if performed too early, may result in renewed activity. This leaves the patient in a less favorable condition for thoracoplasty. If one abandons the pneumothorax too late there may have developed sufficient thickening of the visceral pleura to prevent subsequent expansion and considerable pulmonary tissue will have been needlessly sacrificed. The choice of surgical intervention should be thoracoplasty if the lesion is dense and sclerotic, and phrenicectomy if it is a centrally located apical cavity. Partial apical thoracoplasty entails the potentiality of bronchogenic spread. Complete thoracoplasty is associated with considerable shock and likewise sacrifices uselessly much healthy pulmonary tissue. Also, autopsies have proved that thoracoplasty yields less complete collapse than pneumothorax, especially inferiorly, and the possibility of homolateral basal spread is only partially obviated. Therefore the logical thought remains to perform an apical thoracoplasty in these cases, while conserving the pneumothorax beneath. The dangers of this procedure are however not negligible. These are: *1:* Perforation of the parietal pleura, resulting in subcutaneous emphysema, which however is essentially a benign complication and may be remedied by suture. *2:* Pleuropulmonary perforation, late or immediate, usually due to the rupture of a superficial cavity. The last may be avoided by performing more extensive thoracoplasties in the presence of such cavities. The advantages however outweigh these dangers. Partial thoracoplasties entail a minimum of shock, and only that portion of the lung which is irreparably diseased is sacrificed, while the remaining tissue is protected against extension of the lesion by the pneumothorax and conserved for future functional rehabilitation. There remains the problem of how long to continue the pneumothorax. A case is presented illustrating the unwisdom of immediate postoperative abandoning of the pneumothorax, whereas in another case in which the pneumothorax was continued for a year the final result was excellent. In general, at least six months to one year should lapse before the abandonment of the pneumothorax. A case is also presented illustrating the excellent results that may be obtained by continuing pneumothorax even after complete thoracoplasy. The most complete collapse is thus ensured. In selected cases this combined procedure is of great efficacy.—*Plastie du lobe supérieur et pneumothorax imparfait, Courcoux and Bernou, Rev. d. l. Tuberc., June, 1932, xiii, 569.*—(*A. E. M.*)

Apicolysis with Rubber Dam.—Through an anterior approach, an extrapleural space is made, and a rubber dam is inserted communicating with the exterior. By means of a pneumothorax apparatus air is introduced to promote apical collapse. The first refill is given after the first week and amounts to about 50 cc. After five days a second refill may be given. Refills too soon after operation are not advised. This type of operation is particularly suitable for patients with retroclavicular or subclavicular cavities which are not collapsible by other means. Intracanalicular spread of the disease is rendered less liable because compression of the cavity is carried out slowly. At a later date it is possible to remove the rubber dam and continue the apical collapse with air. The elastic mass can be regulated from the outside, thus obviating other complications, such as occlusion of a bronchus by drainage.—*Sull'apicolisi con polloncini di gomma, G. Di Fonzo, Lotta contro la tubercolosi, October, 1932, iii, no. 10, 1064.*—(*U. E. Z.*)

Oleothorax.—The use of oleothorax in pulmonary-collapse therapy requires a very careful technique. The oil should be warmed to 38°C., and the first injection should consist of only 5 cc. of the oil, in order that the reaction of the pleura may be tested. Mild reactions are frequent, consisting of fever up to 102°F. and soreness in the chest. Repeated doses should not be administered until the reaction has subsided, and as one proceeds with the injections the reactions often cease. It may be necessary to change from paraffin oil to olive oil. Since injection of oil is often followed by varying degrees of serous effusion, the intrapleural pressure may be subsequently greatly increased, so that it is necessary to follow these cases closely, removing air when the gas-pressure rises too high. In one such case the pressure reading was 0 to −2 after the oil was injected, and rose to +13 to +12 following development of a serous effusion. During the injection the gas-pressure must be watched. Usually a two-needle method of administration is employed, but by means of a three-way stop-cock oil can be injected and gas withdrawn alternately in 10-cc. amounts through one needle if one is dealing with a dry pocket. Usually 100 to 200 cc. are injected at a time. It is not necessary to fill the space completely, but rather to leave a small air-pocket which will rapidly absorb. When a pocket is almost completely filled, one must watch the pressure carefully, and

should remove oil immediately if symptoms of overpressure occur. Perforation of the lung may occur during treatment and may result in flooding the opposite lung. If the perforation is due to the underlying disease rather than to faulty technique, early thoracoplasty is indicated. In one instance perforation occurred at the site of a previous cauterization of an adhesion. Oil embolism can occur by means of a vessel which has been opened by the needle; in one such instance the patient developed transitory cerebral symptoms. In another instance in which oil was found in various organs at autopsy, it was felt that the fatal embolism was due to absorption of oil through newly formed capillaries in the pleura which had recently been the site of an effusion. Other inconveniences in the use of oleothorax include the development of paraffinomata, and pleural-cutaneous fistulae, and the rendering of observation of the lung more difficult. Of 150 cases reported by other workers, there were 39 deaths, some of which were directly attributable to the technique.—*Dangers and Complications of Oleothorax, J. N. Haynes, J. Thorac. Surg., October, 1932, ii, 34.*— (*B. B.*)

Complications of Experimental Oleothorax.—Following the endopleural injection of olive oil or paraffine oil in rabbits, it was possible to reproduce complications similar to those observed in patients undergoing therapeutic oleothorax. Perforation of the lung occurs when there is an unequal distribution of the pachypleuritic patches. Inspiratory trauma may further aggravate and exaggerate the break in the pleura. In some rabbits a violent pleurisy was observed with thrombosis of the small pulmonary vessels incident to the penetration of oil into the bronchial veins.—*Contributo sperimentale alla patogenesi degli incidenti da oleotorace., C. Luzzato Fegiz, Tubercolosi, June, 1932, xxiv, 181.*—(*U. E. Z.*)

Separation of Pleural Adhesions.—The two great risks in cutting adhesions are haemorrhage and damage to the lung. The latter may be direct damage, subsequent sloughing, or the tearing of the lung from remaining adhesions. Tuberculous empyema is a less serious and puncture sinus a very rare complication. Cutting through tubercles, causing pleural irritation, and surgical emphysema do not cause anxiety as a rule. In order to avoid cutting the lung, some workers, as Maurer of Davos, cut the adhesions right on the parietal pleura unless they are obviously of the cord- or string-type. The danger of haemorrhage is diminished by the employment of diathermy. A zone of coagulation by diathermy may be cut by the electrocautery. The best method to cut string, cord and thin membranous adhesions is electrocautery. In ordinary adhesions, if the cautery is used at dull-red heat, haemorrhage is uncommon, but it is difficult or impossible to control by this means if severe. In employing diathermy on an adhesion that is vascular and juicy, steam is produced. This steam will extend an unknown distance beyond the area of coagulation. This constitutes a danger when working near pulmonary tissue, for subsequent sloughing may lead to a spontaneous pneumothorax. With a suitable machine, adhesions may be both coagulated and cut by the diathermy current. The machine should be so designed that an adequate cutting current is produced which will enable the wire-electrode to cut cleanly, like a knife, without sticking. The author has designed an instrument to avoid two punctures of the chest-wall. It combines the telescope, coagulating electrode, and cutting wire in one. The illumination by this method is not good and the field of vision is limited. A cannula, through which may be passed a direct-vision telescope with anaesthetizing needle, and a fine electrocautery or a combined diathermy coagulating electrode and cutting wire permit severing by electrocautery or diathermy with excellent illumination and visual field. For simple adhesions one puncture for introducing instruments is sufficient. For difficult adhesions a separate entry for the source of light and the operating instrument is better, because illumination is more brilliant, the field of vision greater, and the direction and control of the cutting more certain. A second cannula permits the use of Maurer's hook, which gives valuable information concerning the attachments, form and structure of the adhesion. Cases are presented to illustrate the value of combining diathermy and electrocautery, the advantages of different telescopes, and the management of complications.—*Adhesion Cutting, with Special Reference to the Uses and Limitations of Diathermy, and the Use of Separate or Combined Endoscope and Operating Instrument, F. G. Chandler, Tubercle, November, 1932, xiv, 49.*—(*T. O. R.*)

Cautery Pneumolysis.—Pneumolysis by the actual cautery was performed in 141 cases of adhesions complicating artificial pneumothorax, with completely satisfactory collapse resulting in 122 cases. Before pneumolysis, effusion was present in 30 cases; and after operation in 64, but in only 9 was this considered of serious consequence. Empyema occurred in 2 patients, both of whom recovered. Since no haemorrhage occurred in this series in which approximately

500 adhesions were severed, it is felt that the danger from bleeding is remote, especially if one is careful to keep the tip of the cautery at low heat. In the first 10 cases, gomenol was introduced into the chest following cauterization, but this procedure was abandoned because all of these cases developed effusions.—*The Results of Cautery Pneumolysis of Adhesions Complicating Artificial Pneumothorax, E. S. Welles, J. Thorac. Surg., August, 1932, i, 601.*—(*B. B.*)

Results of Phrenicectomy.—During the years 1920 to 1929, phrenicectomy was performed on 124 patients, in 111 of whom the late results could be ascertained. They resulted in only 4 per cent cures and in 4 per cent improvements. Since this percentage is not more than could be expected without surgical interference, it is concluded that phrenicectomy is of doubtful therapeutical value. It is stated, however, that the operation is probably indicated in a small number of well-selected patients. This criticism applied only to the procedure as an independent operation. Various complications which were observed following phrenicectomy are discussed.—*Kann man die Phrenicusexairese als Methode der Wahl bei einseitigen kavernösen Prozessen bedingungslos empfehlen? (Geringgradiger Prozentsatz von Kavernenschliessungen. Magenbeschwerden und Miliartuberkulose als Komplikationen.) G. E. Patronikola, Beitr. z. Klin. d. Tuberk., November, 1932, 600.*—(*M. P.*)

Phrenicectomy and Selective Collapse.—It is commonly appreciated that when a few hundred cubic centimetres of air are injected into the pleural space of persons with tuberculosis of one lobe, the slack given by the air to the elastic pull of the lung is frequently taken up more by the diseased than by the normal lobes, with the result that the air resides principally over the diseased lobe and collapses it selectively. Attention has recently been called to the fact that after phrenicectomy for pulmonary tuberculosis the diseased part of the lung may be favorably affected regardless of its position; whereas it was the belief of those who first employed the treatment that it benefited only lesions situated in the lower lobes. The author presents the history of 2 patients in whom selective collapse appeared very shortly after phrenicectomy, as in the case of pneumothorax, without sufficient time to allow for proliferation and contraction of fibrous tissue. The collapse had the characteristics of elastic recoil rather than those of shrinkage of an inelastic substance. The author differentiates, for pneumothorax and phrenicectomy, between the deflation of the diseased tissues which occurs immediately, and is probably due to increased elastic tone of the lung, and that which occurs gradually and is due to formation and contraction of scar-tissue. The increased elastic tension of the lung, in the first type, is believed to be due largely to thickening of the pulmonary septa and membranes from vascular congestion and interstitial deposit of inflammatory fluids and cells.—*Selective Collapse of Lung with Phrenicotomy Comparable to that with Pneumothorax, C. M. Van Allen, J. Am. M. Ass., July 2, 1932, xcix, 13.*—(*G. L. L.*)

Gastric Symptoms Following Phrenicectomy.—One hundred and six cases of left-sided and 126 cases of right-sided phrenicoexairesis have been observed for a long time as to the so called gastrocardiac complex which manifests itself supposedly in cardiac disturbances,—pain over the sternum and in the back, sensation of fulness after meals, pressure in the gastric region, regurgitation, nausea and kindred symptoms. No considerable, lasting subjective cardiac or gastric symptoms were observed. A few patients complained of a sensation of pressure and fulness after meals and of nausea, but these disturbances in nearly all cases disappeared in a few weeks after operation. Dyspnoea on exertion and subjective cardiac symptoms were somewhat more frequent. In adipose patients a slight cardiovascular insufficiency may persist, characterized by cardiac palpitation and dyspnoea on slight exertion. Phrenicoexairesis on either side need not be contraindicated for fear of these complications which have been reported in the literature by several writers.—*Über gastrokardiale Erscheinungen als Folgen und Dauerzustände nach linkseitiger Phrenikusexairese, H. Jahnke, Deutsche med. Wchnschr., December 9, 1932, lviii, 1957.*—(*H. S. W.*)

Phrenicectomy and Alopoecia.—A case is reported of the development of an area of alopoecia, measuring about 4 by 3 cm. in the right submaxillary region, about one week following a second operation necessary to remove an accessory phrenic nerve, and following which operation a sympathetic ophthalmoplegia developed. Five months afterward enophthalmos and miosis had disappeared and a few hairs were scattered over the area of alopoecia.—*Alopecia of Beard Following Phrenicectomy, F. A. Kennedy, J. Am. M. Ass., January 28, 1933, c, 257.*—(*G. L. L.*).

Trends in Thoracoplasty.—In recent years in thoracoplasty more importance has been given to the length of the segments of the removed ribs, especially in relation to the

size of the tuberculous lesion. Predominantly cirrhotic processes without cavities need only a moderate thoracoplasty, whereas tuberculous lesions with cavities are in need of complete collapse, with an almost complete elimination of the thoracic wall within the diseased area. Thus a differentiation between "detension" and "elimination" thoracoplasty is made. The typical Sauerbruch operation is in this sense a detension thoracoplasty and Brauer's subscapular thoracoplasty represents the elimination type. The execution of an effective elimination thoracoplasty necessitates a paravertebral resection of the circular part of all ribs (at the angle of the rib). In Brauer's subscapular thoracoplasty the resected sections in the upper zone are longer and in the lower zone shorter. Where large cavities are present the costal cartilage must be sufficiently yielding as well, which is usually the case in younger individuals. By the use of shot-bags and by other means the caving-in of the ribs may be increased. Large upper-lobe cavities may be closed by an upper-stage thoracoplasty only,—that is, an operation extending from the first to the seventh rib. With an upper-stage thoracoplasty an occasional failure to obliterate cavities may occur; large cavities adherent to the remaining portions of the ribs may be only displaced or flattened. In such cases the cavity must be loosened from the ribs or the rib fragments must be removed. In these cases the anterior ends of the ribs are resected in a second operation (the Sauerbruch-Brunner procedure), the seventh rib being included. Both operations may be performed in one sitting.—*Einige prinzipielle Erwägungen zur Thorakoplastik, W. Kremer, Deutsche med. Wchnschr., September 2, 1932, lviii, 1397.*—(*H. S. W.*)

Postoperative Thoracoplasty Care.—A sling is described for use in the postoperative treatment of thoracoplasty patients. The sling is composed of a canvas strip, 18 inches wide and 3 feet long, with perforations along the two ends through which a rope may be passed. This canvas sling is supported by means of a cord to a single cross-piece on a balkan frame. The ropes are adjusted in such a way that the patient's chest is kept well away from the bed, thus lifting the weight from the shoulder; and the head of the patient is supported on pillows raised to the necessary height. With the use of this sling practically the entire weight of the patient's torso is used to compress the side that has been operated on, and considerable motion can be allowed by raising or lowering the ropes supporting either the front or the back end of the sling, so that the patient can be rolled partly on his face or partly on his back. The arm of the side that has been operated on can be moved fairly freely beneath the sling. The entire sling is let down when the dressings are changed, and also for short periods of time during the day. As a rule patients have not complained that the apparatus is uncomfortable.—*Sling Used in the Postoperative Treatment of Thoracoplasty, A. Weeks and G. D. Delprat, J. Am. M. Ass., November 19, 1932, xcix, 1779.*—(*G. L. L.*)

Pneumonia after Thoracoplasty.—Following thoracoplasty there may occur various types of acute pulmonary reactions, which because of their acuteness have often been erroneously termed nontuberculous pneumonia or oedema of the lung, both clinically and pathologically. If the acute process persists for two or more weeks, the proper diagnosis of tuberculous pneumonia is then usually made. Two cases are detailed in which the acute reaction in the so-called good lung was shown to be a fresh tuberculous process arising by extension from the collapsed area. In the first case a large left sided cavity was compressed by partial thoracoplasty and the patient died on the fifth post-operative day from a right upper pneumonia, which exhibited on microscopical examination not only the typical appearance of an early tuberculous bronchopneumonia, but also small masses of material, containing tubercle bacilli, resembling the tissue found in the compressed cavity. In the second case, death occurred 18 days after partial thoracoplasty was done for a large right sided cavity, and at necropsy a diffuse tuberculous pneumonia of the left lung was seen. Microscopical examination of this fresh lesion demonstrated that it had occurred by way of the bronchi. In this case, the cavity contained only very few tubercle bacilli, and the probable source of dissemination was an old caseous focus at the apex of the lung, which communicated with a bronchus and was beginning to liquefy. The explanation for the development of such pneumonias after thoracoplasty, and not before the operation, probably depends on the number of tubercle bacilli or the amount of bacillary products which are carried into the uninvolved tissue by compression of caseous areas, thus producing an acute type of reaction in an individual who had been previously sensitized.—*The Mechanism of Development of Tuberculous Pneumonia Following Thoracoplasty, H. A. McCordock and H. Ballow, J. Thorac. Surg., October, 1932, ii, 24.*—(*B. B.*)

Bilateral Thoracoplasty.—Bilateral artificial pneumothorax, bilateral phrenic neurectomy and combinations of these procedures, as well as combinations with contra-

lateral thoracoplasty, have been successfully reported by many workers. Experimental studies have shown that the vital capacity is decreased in bilateral open pneumothorax to a degree that approximately equals the decrease produced in unilateral open pneumothorax, provided the combined area of the two openings is no greater than the area of the one opening. It has also been shown that bilateral upper partial thoracoplasty is well tolerated in dogs and in a monkey. On the basis of these experiences, bilateral thoracoplasty was deemed a justifiable procedure. A man, aged forty-seven, who had far-advanced fibrocavernous tuberculosis of the apices of at least fifteen years' duration, in whom attempts at artificial pneumothorax were not successful, and in whom no improvement resulted from seven months' sanatorium care, was considered a suitable case. The upper 5 ribs were removed from the left chest, beginning at the transverse process and extending around to the midaxillary line. The immediate postoperative course resembled that of the usual thoracoplasty done for a unilateral lesion. The improvement that followed was such that the contemplated operation on the contralateral side was postponed, especially since distinct improvement on the unoperated side occurred. About two years after the first operation reactivation of the right side occurred, and a partial upper right thoracoplasty was done, twenty-seven months after the left thoracoplasty, 4 ribs being resected. Satisfactory improvement resulted, and ten months later the patient returned to work. Following the second operation the vital capacity was 2,075 cc. It is felt that the vital capacity should not be decreased below 1,000 cc. by surgical procedures. It is interesting to note that a mild dyspnoea which had developed after the first operation disappeared after the second; it is assumed that this is to be explained by shift of the trachea, although such a shift could not be demonstrated by X-ray. In 2 other patients in whom the first stages of bilateral thoracoplasty were done, no increase in activity of the contralateral lung occurred. *Bilateral Partial Thoracoplasty for Bilateral Pulmonary Tuberculosis, D. S. Allen, J. Thorac. Surg., August, 1932, i, 587.*—(*B. B.*)

Lobectomy and Pneumonectomy.—In experimental animals (dogs) stenosis of the bronchus or bronchi was produced by cauterization with a 35 per cent solution of silver nitrate applied through a bronchoscope. This resulted in atresia of the bronchus and atelectasis. The air-tight closure of the bronchus obviates pleural infection at operation for lobectomy, and haemostasis in the atelectatic lung is relatively easy. One or two lobes were removed in 20 dogs without a death and all lobes on one side were removed in 8 animals with only 1 death. The clinical application of the method is yet to be demonstrated.—*Lobectomy and Pneumonectomy in Dogs, Experimental Surgery, W. E. Adams and H. M. Livingstone, Arch. Surg., November, 1932, xxv, 898.*—(*R. D.*)

Village Settlements.—The limitations imposed upon medical superintendents under local-authority schemes seriously cripple the successful working of any settlement from the financial standpoint. In every village settlement there should be 3 distinct units, namely, the sanatorium, the industries, and the estate in which the settlers are housed with their wives and families. A high standard of medical care has been maintained, as well as several clinical investigations reported at Preston Hall, the British Legion Village. Here the standard of admission has been adjusted to such an extent as to include only those men who are suitable, temperamentally, for life in the Settlement. There are six major industrial departments at Preston Hall which have been able to furnish employment to all the settlers. The industrial unit which has been most beneficial has been one where it is possible to obtain relatively secure markets, for if a relatively large department encounters economic difficulties, even for few weeks in the year, the financial consequences in a village settlement are likely to be severe. Clinically the settlers may be divided into 3 classes: (1) those in whom the disease has reached a stage of arrest and has remained so for a period of at least 5 years; (2) those in whom the disease is definitely advanced or in whom symptoms of activity appear from time to time; and (3) those who are able to live in the Settlement but who are only occasionally able to undertake routine work. Every new settler who is taken on the staff is notified that a 5 years' security of tenure will be given but that in the event of the disease in the chest being arrested at the end of that time he may be asked to leave.—*Some Experiences at a Village Settlement for the Tuberculous, J. B. McDougall, Tubercle, February, 1933, xiv, 199.*—(*T. O. R.*)

Sanatorium versus Climatic Treatment.—Revolutionary changes have occurred from time to time in the strictly scientific aspects of tuberculosis, so that it is not surprising that greater modifications have taken place in the realm of treatment. This has been especially true in evaluating the effects of climate and all its accessory factors, as promulgated by the protagonists of the various health-resorts throughout the

world. Many phthisiologists believed that the tuberculosis patient could receive adequate care in his own residential locality without the necessity of climatic change. Equally good results have been reported from institutions situated in the mountains and those on the plains. No matter where the sanatorium may be, patients recover if proper rest is secured. In the sanatorium local and general factors play an important part in the ultimate result. Respiratory movements are accentuated by excessive bodily exercise and, to a smaller degree, by talking. The frequency, depth, and rhythmicity of respiration vary proportionately with the extent of exertion. Open air rest in a cure chair, with the enforcement of silence, is very valuable. Bed-rest gives rise to a weakening of the organic forces and vegetative system. Local pulmonary rest acts, in principle, similarly to artificial pneumothorax. The advantage of sanatorium treatment is not due to any fixed climatic characteristic of the locale, but depends upon a relative factor peculiar to each patient. To achieve this relative rest it is simply a matter of changing the patient's environment to one a little different. It is this change in the patient's surroundings that accounts for the good results obtained in almost every sanatorium whether on the mountain top or in the valley.—*La crisi della climatoterapia sanatoriale, G. F. Capuani, reprint from L'Ospedale Maggiore di Novara, 1932, x, no. 5.—(U. E. Z.)*

Salt-Free Dietary Treatment of Surgical Tuberculosis.—There are various theories about diet in the treatment of tuberculosis. All writers agree that there must be a high caloric content and, although it is still questioned by some, it is felt by most that the protein intake must be more than adequate. Fats are allowed in abundance and codliver-oil combined with phosphorus is added. One school favors restriction of carbohydrates and the other favors a large intake. The most important factor is the strict limitation of salt. The human body requires very little salt, even less than 2 gm. daily. Recently the chlorine ion has been shown to be harmful and the sodium ion to be responsible for disturbances in the balance of mineral salts. There is a marked deficiency of mineral salts in acute tuberculosis, but this is restored as the disease becomes chronic. An abundant intake of mineral salts is important because they are stored up in a slightly active balance. Gerson advises the administration of mineralogen which contains ten different mineral salts. This has not been proved to be absolutely necessary. The diet should also be very rich in vitamines. Because there is a difference between a chemical and a physicochemical reaction in the body the question of diet acidity or alkalinity has not been fully settled. The best clinical results of dietary treatment are obtained in lupus. Other forms of surgical tuberculosis show very good results, and brief mention is made of various types of lesions in bones, joints and soft tissues which have healed after the use of salt-free diet. Two important factors must not be omitted. The food should be prepared by specially trained dietitians, and small, frequent meals should be served rather than three ample ones a day.—*Salt Free Diet in the Treatment of Surgical Tuberculosis, M. W. Mettenleiter, Am. J. Surg., November, 1932, xviii, 337.—(J. F. B.)*

Ergosterol and Calcification.—Calcification of tubercles plays an important part in the healing of tuberculosis and has led to considerable investigation concerning the effect of irradiated ergosterol on tuberculous lesions. Two series of experiments (A and B) were conducted, employing in each series 13 guinea pigs weighing about 325 gm. each. In these two series 10 guinea pigs were injected intramuscularly with a virulent culture of human tubercle bacilli, 3 serving as non-tuberculous controls. In series B an attempt was made to simulate tuberculosis as it occurs in human beings. The procedure was the same as in series A, except that a preliminary injection of a known avirulent strain of human tubercle bacilli was given to all 13 animals 6 weeks before the virulent culture was introduced. Each guinea pig in group 1 (nos. 1, 2, 3 and 4) was given daily 0.1 cc. of this preparation of irradiated ergosterol from the 1st to the 14th day, and 0.2 cc. from the 15th day until the completion of the experiment (85th day). The aim in starting the administration of viosterol to this group before the development of tuberculous lesions was to note any possible prophylactic value. The animals in group 2 (nos. 5, 6, 7 and 8) were given 0.2 cc. of visoterol daily from the 15th to the 30th day. On the 30th day animal 8 died during a period of extremely hot weather. The viscera of this animal, on postmortem examination, did not show any gross calcification of the tuberculous lesions. Therefore, the viosterol dosage for the remaining 3 animals (5, 6 and 7) in this group was increased to 1 cc. daily, which was continued from the 31st day until the end of the experiment. During this period the viosterol was omitted every 4th or 5th day. It was noted that the daily administration of viosterol in oil 1000 X, in doses varying from 0.1 to 1 cc., caused deposition of calcium in the caseous tubercles in guinea pigs. The blood

of the animals so affected showed both hypercalcaemia and hyperphosphataemia. There was no evidence of calcium depletion in the roentgenograms of the bones. Spontaneous calcification did not occur in the tuberculous animals which received no viosterol. The most intense calcification was found in the lymph nodes and spleen of those tuberculous animals which were given the largest doses of viosterol. Calcium deposits were noted only in the caseated areas. Undesirable calcification ensues if viosterol is given over a prolonged period in excessively large doses. In this investigation 0.2 cc. of viosterol in oil 1000X was administered daily for 2 months without any apparent harm. When continued for 84 days undesirable calcification occurred. This dosage is equivalent to 6 cc. per kilo of viosterol in oil 250D. Calcification was present in the walls of the renal blood-vessels and in the renal tubules of both the tuberculous and nontuberculous animals, which received daily amounts of viosterol in oil 1000X varying from 0.5 to 1 cc. for more than 2 months. No calcium deposits were seen in the apparently normal portions of any of the other organs. The tuberculous animals which received the preliminary sensitizing injection did not show any definite calcification, possibly because the effect of viosterol is diminished in the presence of a fulminating secondary tuberculous process. The calcification of tubercles which was noted in this investigation is not an expression of simple tissue necrosis but rather a reparative process.—*The Effect of Irradiated Ergosterol on Calcification of Tubercles in Experimental Tuberculosis, M. Jampolis and D. B. Witt., Am. J. Med. Sc., March, 1933, clxxxv, 338.*—(*W. I. W.*)

Tuberculin Treatment.—Tuberculin is indicated in patients with some surgical manifestation, such as genitourinary tuberculosis, and in patients in whom, although the disease has retrogressed satisfactorily, a small amount of expectoration containing tubercle bacilli persists. It is contraindicated in patients with active, progressing, caseous disease or evidence of recent progression, fever, miliary tuberculosis, or definite albuminuria which is not due to renal or vesical tuberculosis. B. E. is preferred for medical cases, although T. R. has been used for surgical cases. Treatment was started with infinitesimal doses and increased gradually enough to avoid any general reaction. Subcutaneous injections were used almost exclusively. The difficulty in treatment is the inability to foretell the degree of focal response to any dose or to control this except by the most cautious graduation of dose.—*The Position To-day of Tuberculin in Treatment, R. A. Young, Brit. M. J., December 17, 1932, no. 3754, 1091.*—(*T. O. R.*)

Tuberculin Treatment.—Tuberculin is useful in the treatment of pulmonary tuberculosis, when it is administered correctly. The method outlined has been used since 1913. No patient receives the treatment unless his temperature does not exceed 99° with little exercise. Treatment is begun with Old Tuberculin Bovine. Later the human type is given. The secret of success lies in the adaptation of the rate of increase of dosage to the individual patient. Dosage is determined by the maximal amount that can be given without reaction. Treatment is continued for three months after there are no signs or symptoms of disease. A chart is given which shows results in a varying number of years after treatment. Routine sanatorium care and bed-rest is shown to be less valuable for patients, as regards recovery and maintenance of working power, than is ambulant tuberculin treatment.—*The Use of Tuberculin in the Treatment of Pulmonary Tuberculosis, J. R. Gillespie, J. State Med., December, 1932, xl, 727.*—(*J. F. B.*)

Tuberculin Treatment and Allergy.—This work was undertaken in order to find out how tuberculin allergy changes under treatment, and how such changes were related to the effect of the treatment. The principle of treatment was to avoid clinically demonstrable reactions and to decrease the systemic sensitivity to tuberculin. Old Tuberculin was given intravenously, because this mode of application seemed to ensure more correct dosage and it would avoid the variability of resorption from subcutaneous depots. This form of administration was well tolerated, systemic reactions were very rare, and it was possible to give, finally, high dosages, indicating a marked depression of the systemic reactibility. The addition of serum to tuberculin had no apparent advantages. Following suggestions by Bier, iodine was given by mouth with the expectation that it prevents tissue destruction. In the combination with iodine, the tuberculin dosage could be considerably increased, and it was particularly easy to reach large doses of tuberculin. This combination permitted of treating children with severe and destructive processes. The clinical result was satisfactory. But the main interest was centered on questions mentioned above and not on clinical results. Under tuberculin treatment, systemic and cutaneous allergy do not go parallel. It was observed that when the skin allergy was easily and markedly

depressed, it would return more slowly after cessation of treatment. After complete skin anergy was obtained, the injection of 1 mgm. of killed tubercle bacilli was tolerated without a demonstrable intracutaneous reaction. This test was performed in the various stages of allergy and anergy, and it was found that tuberculous patients, rendered anergic by tuberculin treatment, reacted like noninfected children, with the exception that the bacilli were destroyed in their cutaneous depots as fast as in those of allergic individuals. The cutaneous anergy following tuberculin treatment is strictly specific, that is, children rendered anergic retain their sensitivity to local serum reactions, while it was shown that the anergy produced by acute tuberculin shock is a nonspecific antianaphylaxis. Treatment with peptone in comparable amounts to that contained in Old Tuberculin does not produce anergy. The positive anergy after tuberculin treatment is not a result of exhaustion, since, as mentioned above, the increased bacteriolytic power of the allergic state is retained. While even massive amounts of Old Tuberculin (5000 mgm.) failed to produce complement-fixing antibodies in noninfected individuals, it was easy to increase the antibodies in infected children. The antibodies show no relation to the amount of tuberculin injected, but they go parallel with cutaneous anergy. Serum of locally anergic patients neutralizes tuberculin. This is explained on the assumption that anergic individuals contain lytic substances in their serum and that these substances are the cause for the local anergy. The process of immunization during specific treatment is explained as follows: the specific stimulus increases the tuberculin-lytic antibodies in the focus, and if the stimulus is of sufficient vigor and duration, these antibodies are discharged into the circulation, causing, by virtue of their lytic action, the cutaneous anergy. In spontaneous healing of tuberculosis, tuberculous tissue disappears; this causes a decrease of the systemic tuberculin allergy, while the cutaneous allergy remains intact. In contradistinction to this it is found that under specific treatment, both the systemic and the cutaneous allergy are depressed. These observations justify Bessau's opinion that only the cutaneous allergy is a measure of immunity under natural conditions. The clinical results of tuberculin treatment with the indicated method, as well as the experimental findings, indicate that the systemic and cutaneous anergy produced by tuberculin treatment is a manifestation of an increased immunity.—*Über langdauernde, ohne klinisch wahrnehmbare Herd- und Allgemeinreaktionen durchgeführte Tuberkulinkuren und über den nach ihnen auftretenden Unempfindlichkeitszustand, H. Fernbach, Beitr. z. Klin. d. Tuberk., November, 1932, lxxxi, 301.*—(*M. P.*)

Methylated Antigen in Treatment of Extrapulmonary Tuberculosis.—This preparation consists of a methyl-alcohol extract of tubercle bacilli that have first been killed, dried, and defatted with acetone. French observers have reported good results in experimental animals and in the treatment of extrapulmonary tuberculosis in human beings. The antigen is administered subcutaneously or intramuscularly in increasing doses at decreasing intervals. In the series here reported striking results were obtained in cases of phlyctenular disease associated with tuberculous infection. In tuberculosis of the bone, skin and lymph-nodes the treatment offers sufficient hope of success to merit a fair trial.—*Treatment of Extrapulmonary Tuberculosis with Methylated Antigen, Gladys L. Boyd and H. C. Parsons, Am. J. Dis. Child., November, 1932, xliv, 1007.*—(*M. D.*)

Turtle-Bacillus Vaccine.—A report of the use of turtle vaccine in the treatment of tuberculosis was published in *Tubercle*, October, 1930. An account of the vaccine and method of dosage was described. Since that time patients so treated have been observed and no conclusions can be drawn indicating any marked beneficial effect from the use of the vaccine.—*A Further Note on the Treatment of Tuberculosis with Turtle Vaccine, W. C. Fowler, Tubercle, October, 1932, xiii, 1.*—(*M. E. P.*)

Investigations on Catalsan.—*Catalsan* is an "abiuret, filterable substance obtained from Old Tuberculin by fractionation" (L. Tomarkin). It exhibited no toxic action following perfusion of frogs and the intravenous, paravenous, and intracutaneous injection of mice and rabbits. Injection of large amounts in mammals produced no alteration in the blood-pressure or pulse-rate of the Bock-Hering heart-lung preparation. Rats, mice, and small dogs were injected, partly subcutaneously and partly intravenously, every two days for several weeks. The animals remained in good condition, gained weight, were lively, and their urine never showed any pathological constituents. From sugar and lactic-acid determinations on the surviving liver of a dog, it was concluded that catalsan does not injure this organ. The influence on allergic processes of this apparently noninjurious substance was investigated. It induced no anaphylactic shock in guinea pigs sensitized with horse-serum together with catalsan. Desensitization

through the agency of catalsan does not take place, but, in certain circumstances, an inhibition of the shock may be accepted as occurring to some extent. The differences between animals treated with catalsan and the controls were too small to permit any conclusions as to the effectiveness of the treatment.—*Investigations on Catalsan, F. Gottdenker, Tubercle, December, 1932, xiv, 97.*—(*T. O. R.*)

Malaria Treatment of Tuberculosis.—Malaria stimulates the reticuloendothelial system, with the consequent production of a monocytosis. Histological studies prove that malaria induces a connective-tissue or reticuloendothelial reaction in all organs and at all ages. Malaria therapy could, therefore, be a form of opotherapy. The virulence of the malarial organism (artifically cultivated) would be attenuated, so that the febrile attacks would be less severe than those resulting from bacterial vaccination or tuberculin injection. Contrary to the usual belief that malaria aggravates tuberculosis or has an unfavorable influence upon it, two cases are reported. Both patients, one 12 and the other 24 years old, gave a history of previous malarial attacks. The pulmonary tuberculous infection, which they developed years later, was of the productive rather than the exudative type that is more frequently encountered at their particular ages. Malaria, in the treatment of tuberculosis, would sensitize the individual by producing a specific tissue reaction. The concomitant use of artificial pneumothorax would accelerate recovery.—*Opoterapia e malarizzazione endo-bio-stimolo nella tubercolosi come stimolazione del reticoloendotelio, F. Garofali, Tubercolosi, October, 1932, xxiv, 335.*—(*U. E. Z.*)

Gold Treatment of Tuberculosis.—The gold salts have an indirect nosotropic effect but no direct parasitotropic action. A slow, continuous catabolism of body cells and of bacilli takes place in and around the tuberculous foci. Liberated toxins, acting through the blood and exciting protective reactions, bring about a reactive equilibrium. This reaction is enhanced by the toxic influence of the gold salt. Furthermore, the cells of the reticuloendothelial system are important in effecting the inflammatory reaction in the neighborhood of tuberculous foci. And it may be that through the storage of gold in these cells there results an activation of this system, whereby a long continued influence of the gold salts on the sick organism is produced. Rabbits were injected intramuscularly with large doses of *oleosolganal*. Gold was found in the blood-serum and lymph. It was stored in the connective tissue of the spleen, in the Kupffer star-cells of the liver, in the adventitial cells of the periportal connective tissue, and much less in the lungs. No strong affinity for tuberculous foci could be demonstrated. Gold was excreted by the intestinal mucosa and by the epithelium of the convoluted tubules of the kidney. Animals have been injected with various gold preparations. From experiments on rabbits with *solganal oleosum*, it appears that a better antituberculous effect is obtainable with gold salts if the infected organism is saturated with gold. Criteria of improvement are as follows: a shift to the right in the Arneth index, a moderate eosinophilia, lympho- and monocytosis, an increase in allergy, improvement in the red-corpuscle sedimentation rate, the precipitin and complement fixation tests. A large increase in the eosinophiles and neutrophiles, the appearance of anergy and the reduction in antibodies is to be regarded as evidence of poisoning. The organs most frequently damaged by toxic effects of the heavy metals are the kidneys. Toxicodermatitides are no longer common, and stomatitis and gastroenteritis are less severe since the adoption of *oleosolganal* and *solganal oleosum*. Gold therapy is especially suitable for cases in which an intact and reactive reticuloendothelial system is present. This includes the productive-cirrhotic forms, localized tuberculosis of haematogenous origin, and to a lesser extent those cases which are purely exudative. Gold therapy is also indicated in cases of tuberculosis of the mucosae and skin, tuberculosis with chronic arthritis, tuberculous rheumatism of Poncet, syphilis and tuberculosis combined, or true *lues pulmonum*. The contraindications are serious disturbances of the bowels, the liver and kidneys, and anergic states with high fever and increasing disintegration. Watery solutions of gold salts are as a rule given intravenously. Gold oils are administered intramuscularly and are preferable because toxic manifestations are less frequent and less severe. Gold therapy was especially beneficial to laryngeal tuberculosis. Statistics support this statement. However, gold therapy continues to be only a valuable support in cases suitable for other methods of treatment.—*On Gold Therapy in Tuberculosis, G. Schröder, Tubercle, February, 1933, xiv, 193.*—(*T. O. R.*)

Treatment of Pulmonary Tuberculosis with Corrosive-Sublimate Inhalations.—Since 1914 salvarsan therapy, as introduced by Brauers and Perrin, has become paramount in the treatment of pulmonary gangrene. For the purpose of inhalation

therapy (which still is the most simple method of treatment) etherized oils, especially turpentine, have been used. Inhalations of corrosive sublimate for pulmonary gangrene and putrid bronchitis have been used for many years as an adjunct to or as a substitute for salvarsan therapy. Up to 25 cc. daily of a 1:1000 corrosive-sublimate solution is inhaled by means of a vapor atomizer. Symptoms of mercurial poisoning have not been observed. A slight amount of albumen has been eliminated in the urine, but this does not constitute a contraindication. It is advisable to protect the eyes from the vapor. The foetor of the sputum and breath diminishes, sputum decreases, and the temperature is favorably influenced. In the past few years 12 patients with pulmonary gangrene were thus treated. Four of these died, 5 recovered fully, 3 improved greatly.—*Sublimatinhalationen in der Therapie der Lungengangrän, R. v. Engel, Deutsche med. Wchnschr., December 2, 1932, lviii, 1924.*—(*H. S. W.*)

***Disulphamin* in Pulmonary Tuberculosis.**—*Disulphamin* is a complicated compound of sulpho-ortho-oxybenzoylic-hexamethylentetramin and sodium nucleinate with dimethyl-amino-oxyphenazon-camphor. It is given orally, and in 82 patients it produced a decrease of temperature and general beneficial effects.—*Zur Umstimmungsbehandlung der Lungentuberkulose, F. Mattausch, Beitr. z. Klin. d. Tuberk., November, 1932, lxxxi, 591.*—(*M. P.*)

Allergic Diseases.—Anaphylactic shock is explained as an allergen-antibody reaction, in which the liver and the reticuloendothelial system seem to play an important rôle. Serum-disease, bronchial asthma, hay fever, urticaria, Quincke's oedema, membranous colitis, certain cases of migraine and epilepsy and haemorrhagic purpura are considered allergic diseases. Serum-disease can be prevented by the use of sera of a high antitoxin content, by small doses given at first intracutaneously or subcutaneously and by alternating sera obtained from various animal species. The treatment of the shock requires cardiac stimulation, hypodermatoclysis with or without the addition of adrenalin and the use of calcium, which seems to be of value especially in children. Characteristic for the allergic reaction is the drop in blood-pressure, changes in clotting time and leucopoenia, a syndrome which has been described by Widal as "haemoclastic crisis." Concerning the treatment of bronchial asthma the fact is emphasized that skin reactions do not always indicate the allergen which is the causative factor. Climatic allergens and Storm van Leuwen's allergen-free chambers are mentioned. In addition to the drugs used for relief during the attack, tuberculin treatment is recommended, with which good results can be obtained. In other cases foreign-protein therapy (milk or peptone) or injections of a one per cent suspension of sulphur in oil have been successful. The allergic nature of some cases of migraine is suggested by the frequency of eosinophilia, positive skin reactions to food proteins and the symptoms of a haemoclastic crisis. In selected cases the treatment with vaccines, prepared from intestinal bacteria, according to Coke, has been successful. Allergy to certain drugs or foods undoubtedly exists sometimes in epilepsy, too, and must be considered a causative or contributory factor. The aetiology of Quincke's disease is not known but numerous case-reports point to the important rôle which allergy may play in the production of intermittent angioneurotic oedema. Mucous colitis, which Struempel has called "intestinal asthma," is obviously an allergic enteritis, characterized by the presence of eosinophiles and Charcot-Leyden's crystals in the stools. If the allergic aetiology of any of these conditions is suspected a careful history should be taken, a complete blood study should be made and skin tests should be applied. If the offending substance is found desensitization should be tried. In various allergic diseases an acid diet is recommended, with the addition of ammonium chloride and calcium compounds.—*Die Theorie der allergischen Erkrankungen vom Standpunkt des Internisten, F. Pineles, Wien klin. Wchnschr., October 7, 1932, xlv, 1262.*—(*K. F.*)

Asthma and Sinusitis.—A study was made of several hundred asthmatic patients with special reference to nose and throat, and 40 patients were selected for treatment by means of sinus surgery. All were observed from six months to seven years following their sinus operations. Both antra were found diseased in 32 cases, both ethmoids in 26, both frontals in 17 and both sphenoids in fifteen. Unilateral antrum disease was found in 7 cases, unilateral ethmoiditis in two, and unilateral frontal sinusitis in three. The sphenoid was never found to be involved singly or without simultaneous involvement of other sinuses. Roentgenograms were employed routinely before operation as a check on the clinical diagnosis. On a classified basis thirty-two had intrinsic asthma, six had extrinsic asthma, one had unclassified asthma, and one had reflex asthma. No children under 12 years of age were included in the investigation. Fifty-seven operations were done in the course of the study, varying

from the most conservative, such as intranasal antrotomy, to the most radical, such as the external approach to the frontal, ethmoid and sphenoid, with an accompanying radical operation on the antrum. One patient died of postoperative meningitis following ethmoidectomy. Two patients died of intercurrent disease from one to two years after operation. Of the 40 patients operated on, five were "cured" of asthma, nine were markedly improved, six were moderately improved, and two were slightly improved. There were 18 patients who had ultimately no improvement in their asthma, although seven of these showed temporary improvement or "cure." According to observations in the group studied, 75 per cent of the patients having asthma associated with sinusitis show a favorable local result in the nose following nasal surgery, but have only about a 50 per cent chance for relatively long-continued favorable changes in their asthma. Six patients having extrinsic asthma were not improved. Surgical improvement of one side of a bilateral pansinusitis may be followed by marked improvement in the patient's asthma. The most favorable cases for surgical improvement in asthma are those with polypi in the nose and sinuses; patients having thickened membrane or cysts in the sinuses are unfavorable subjects for such improvement.—*Studies in Asthma. XVIII. The Surgical Treatment of Chronic Sinusitis in Asthma, F. L. Weille, J. Am. M. Ass., January 28, 1933, c, 241.*—(*G. L. L.*)

Treatment of Asthma.—The authors report concerning a group of 42 patients with intractable asthma, 70 per cent of whom had complications such as emphysema, chronic bronchitis or bronchiectasis, and all of whom had been unrelieved by the usual methods of treatment. Fever, produced by high-frequency currents, was tried in all of these patients and was found to be a safe procedure. A high-frequency-current generator of low voltage, having a capacity of 10 amperes, was used. This amperage is sufficient for two patients arranged in series, to be treated at the same time, and results in a material saving of time. Neymann fenestrated electrodes are used, with the entire trunk sandwiched between them and held in place by a canvas jacket made especially for this purpose. The patient is wrapped in two layers of bath blankets to absorb the perspiration, and enclosed in a specially prepared water-proofed heat insulating bag with suitable openings for electrode leads and thermometer readings. The amount and duration of current-flow necessary to secure the desired temperature differs with patients. Four thousand milliamperes was the general average used by the authors. An hour and three-fourths was the average time necessary to secure and sustain a rectal temperature of 104°F. for eight hours. Of thirty-five of those in whom the results have been ascertained, 51 per cent had a complete remission, varying from several days to nine and one-half months, and 29 per cent had improvement without remissions. It is possible that with cases of milder degree and with more persistent treatment even better results might be obtained. The laboratory determinations and other observations do not as yet allow any conclusion as to the mechanism of this relief. It is suggested that fever therapy may possibly be found useful in other allergic conditions, such as urticaria, angioneurotic oedema, eczema, hay fever and migraine.—*Sustained Artificial Fever in the Treatment of Intractable Asthma: Physiologic and Therapeutic Considerations, S. M. Feinberg, S. L. Osborne and M. J. Steinberg, J. Am. M. Ass., September 3, 1932, xcix, 801.*—(*G. L. L.*)

Treatment of Asthma.—The treatment of patients with so-called "wet" asthma at Saint-Honoré has met with greater success coincident with the practice of new therapy during the past twenty years. The use of sulphur in baths, inhalations, and ingestion, either in part or in whole, in itself is insufficient. Adrenalin and ephedrin play their parts as specific drugs, and desensitization as a specific procedure. Both X-rays and ultraviolet rays have been utilized. The dry, hot, equitable climate offers striking relief to asthmatic patients. But in addition to these methods of attack, and essential to any lasting improvement, the necessity for regimen, and the strict adherence to a special dietary are procedures whose importance have been understood only with the recognition of the concept of an hepatorenal factor in the aetiology of bronchial asthma.—*Les asthmatiques et les emphysémateux à Saint-Honoré, Ségard, Arch. Méd-Chir. de l'App. Respir., 1932, vii, 97,*—(*V. T.*)

Treatment of Asthma with Tuberculin.—The series of 36 cases of asthma treated by subcutaneous injections of Old Tuberculin described in 1930 has been followed up. There has been a tendency to relapse, so that the present results are less encouraging than those previously reported. The cases treated subsequently, up to and including 1931, are added, bringing the total treated to 103. Tuberculin therapy is indicated in those cases in which the asthmatic state remains after the more conventional lines of treatment have been carried out.

The commonest apparent causes of failure have been overdosage, premature termination of the course of treatment, and marked psychological abnormality of the patient. It is concluded that the method yields results which are still sufficiently good to warrant a trial of tuberculin in all apparently suitable cases.—*Further Report on the Tuberculin Treatment of Asthma, J. Maxwell, Brit. M. J., December 31, 1932, no. 3756, 1182.*—(*T. O. R.*)

Lipiodol in Asthma.—Provided there is no spasm of the bronchial muscles, lipiodol, when injected into the bronchial tree of an asthmatic patient, penetrates with remarkable freedom into the minutest ramifications, and, unless there is emphysema or the patient coughs, it will stop short of the alveoli. If there is spasm of the bronchial muscles, or if there is spasm in a particular area of the lung, it will not penetrate. Most commonly the bronchioles are seen to be in a state of dilatation. When there is emphysematous distention which entails loss of control of the potential sphincter at the junction of the terminal tubules with the alveoli, entry of fluid into the alveoli may occur without cough. Even in the absence of cough or emphysema, examination the day following injection will show that the lipiodol has invaded the alveoli. Other cases will show constriction of the bronchioles in one area and dilatation of the bronchioles elsewhere. Rarely there may be shown little, if any, penetration of lipiodol into the tubes, as the result of a paroxysm during the injection. In explanation of the more usual result of lipiodol injection it may be suggested that, in ordinary cases of asthma, this quiescent stage marks the phase of sympathetic action responsible for the relaxation of the bronchial musculature. In the spasmodic stage the converse is brought about during the phase of vagal impulses and leads to constriction and obstruction of the respiratory passages. These antagonistic nerve impulses do not necessarily involve the whole lung, but may be confined in their action to a part of a lobe, to a bronchus, or to an isolated area. In addition to its value as a means of study of the bronchial tree, lipiodol is useful as a therapeutic agent in asthma.—*The Anatomy of Asthma as Disclosed by Lipiodol Investigation, J. B. Christopherson, Lancet, January 7, 1933, ccxxiv, 11.*—(*E. H. K.*)

Infections of Respiratory Tract.—The natural springs at La Bourboule are unique in Europe in their widely varying content of arsenic, the arsenical equivalent per litre ranging from 6 to 34 drops of Fowler's solution. The waters of the cooler springs are used for drinking purposes and for baths, whereas the vapor from the hot springs is of value in inhalations. In addition to the arsenical component of the medicinal waters, they contain radioactive substances. The altitude at La Bourboule is high, the air dry and stimulating. This combination lends itself to the treatment of a wide range of pathological conditions occurring both in childhood and during adult life, in particular those resulting from arsenical deficiency, including the anaemias, the dermatoses, the nutritional problems, and those changes subsequent to infections in the upper and lower respiratory tracts. Treatment on the other hand is contraindicated in patients with acute febrile illnesses, with myocardial or renal insufficiency, with pulmonary or visceral tuberculosis, or finally with carcinoma, or idiopathic affections of the liver, either cirrhoses, or neoplasms.—*Les Affections des voies respiratoires à la Bourboule, H. Jumon, Arch. Med-Chir. de l'App. Respir., 1932, vii, 103.*—(*V. T.*)

Sun-Bronchitis.—Contrary to the findings of Klare, among the many thousand children given heliotherapy at Bad Dürrheim during the past twenty years, treatment was not interrupted in a single instance due to the development of so-called sun-bronchitis. The pathological process in these children was predominantly lymph node in distribution, and the cases included a number of the "sun sensitive" constitutional type, the fair skinned child with blond or dark red hair. The elevation of Bad Dürrheim is about 720 m., the sun is brilliant, and rich in ultraviolet rays. No sun filters are used. In view of this experience, heliotherapy cannot therefore be held responsible for the development of bronchitis, as reported in a series of cases by Klare, and thus its therapeutic benefit should not be withheld through fear of initiating this complication.—*Zur Frage der Klareschen "Sonnenbronchitis," Harrass, München. med. Wchnschr., July 1, 1932, lxxix, 1085.*—(*V. T.*)

Reaction-Bronchitis.—Of the 1,000 children who come yearly to Düsseldorf for climatic convalescent care, many develop an acute bronchitis within a few days after open-air treatment has been initiated. The bronchitis subsides rapidly under symptomatic therapy. An explanation is seen in the increase in the amount of lymph and mucus in the bronchi and bronchioles contingent on the improved pulmonary circulation of both lymph and blood following the proper use of the thorax in breathing and exercise—a mechanism poorly developed in the city children constituting the major part of the

clinical material.—*Reaktionsbronchitis, R. Lehmann, München. med. Wchnschr., July 1, 1932, lxxix, 1086.*—(*V. T.*)

Lobar Pneumonia an Allergic Phenomenon.—The sudden onset and the rapid spread of the inflammatory processes in one lung in cases of lobar pneumonia suggest that the disease is an expression of an altered sensitiveness of the lung to the pneumococcus or an allergic phenomenon. The results of a study of the allergic reaction in the lungs of animals sensitized to a foreign protein are reported. Rabbits were sensitized by the injection of 40 cc. of horse-serum given intraperitoneally in divided doses. On the sixth day after the last injection the animals received an injection of the same serum into the lung by way of the trachea. The rabbits were killed at intervals of from about one hour to several weeks and their lungs studied. Parallel studies were made on the lungs of normal animals that had received horse serum intratracheally. The specificity of the reaction in the first series of animals was verified by treating a few of them intratracheally with human serum instead of horse-serum. *Results:* The injection of small amounts (1 cc.) of horse-serum into the lungs of normal rabbits produces a transient pneumonitis confined to the dorsal aspect of both lungs. The injection of the same amount of horse-serum into the lungs of rabbits that have been previously sensitized to the same serum causes, in a high percentage of cases, a lesion which is confined to one lung with the gross and microscopical features of lobar (fibrinous) pneumonia as seen in man.—*Allergic Lobar Pneumonia, Experimental Study, B. M. Fried, J. Exper. Med., January 1, 1933, lvii, 111.*—(*J. S. W.*)

Pneumonia from Kerosene Poisoning. Nine cases of kerosene poisoning in children are reported. The signs were marked drowsiness or actual coma, fever and abdominal tenseness. They all developed pulmonary involvement varying from mild bronchitis to severe and fatal pneumonia. Animal experiments tend to confirm the clinical opinion that the serious and fatal cases of kerosene poisoning are due to the aspiration of kerosene into the lungs, with production of inflammation and oedema, and a potentially fatal pneumonitis.—*Pneumonia in Kerosene Poisoning, J. I. Waring, Am. J. Med. Sc., March, 1933, clxxxv, 325.*—(*W. I. W.*)

Treatment of Lobar Pneumonia with Artificial Pneumothorax.—Coghlan's report of the beneficial influence of artificial pneumothorax on the course of lobar pneumonia is in principle confirmed by the observations made on 7 cases of lobar pneumonia in which collapse of the involved side was used with apparently encouraging results. Artificial pneumothorax was induced soon after admission and comparatively small amounts (up to 500 cc.) were injected. A prompt reaction within fifteen minutes, which has been described by Coghlan, was observed in one instance only. In most of the cases, however, the administration of artificial pneumothorax was followed by subjective and objective improvement. The respiration became easier, the heart action was slower, pleural pains subsided promptly, and the temperature as a rule dropped sharply. In one case an empyema and in another instance a pleural effusion developed. The rationale of the use of artificial pneumothorax in lobar pneumonia is, according to Coghlan, the decrease in the blood- and lymph-circulation and the diminished absorption of toxins due to the compression of the infiltrated areas, while the separation of the pleural leaves and functional rest of the involved lung are the two other important factors. This explanation is not accepted. In view of the small amounts of air which were used it is pointed out that the resulting compression is insufficient to reduce the circulation or the absorption of toxins to a great extent or to cause complete functional rest. An explanation is offered by protoplasm activation, mobilization of antibodies and consequent increase in the defensive powers of the body, which may account for the beneficial influence of the treatment of the pulmonary lesion on the course of the general systemic infection. Artificial pneumothorax is indicated in uncomplicated cases of acute lobar pneumonia, and should be applied within the first five days. Best results can be expected in patients below forty. The absorption of air is as a rule very slow. The reaction varies considerably but rarely resembles a true crisis as observed by Coghlan.—*Behandlung der Pneumonien mit künstlichem Pneumothorax, S. Perlroth and M. Topercer, Wien. klin. Wchnschr., December 2, 1932, vi, 1508.*—(*K. F.*)

Bronchostenosis.—A general discussion of bronchostenosis is given, including the history, causes and physical signs of the disturbance. Bronchial stenosis is not infrequent, occurring in one out of every 10 cases in the Thoracic Clinic at the Massachusetts General Hospital. The causes of stenosis, in the order of their frequency, include inflammatory tissue, bronchial tumors, foreign bodies, and encroachment of the bronchi from without. In a large proportion of cases, there are no symptoms which can with cer-

tainty be ascribed to the obstruction, and except in cases of foreign-body obstruction the history is often not distinctive. The extent to which a bronchus may be occluded, without giving physical signs of the disease, is at times remarkable. The signs of bronchial obstruction with resulting atelectasis include dulness, diminished or absent vesicular breathing, diminished voice sounds without aegophony, and diminished or absent whisper and tactile fremitus, but similar signs can be produced in other conditions, for instance, some abscesses or tumors. When a valvular bronchial obstruction exists, overdistention of the lung, as evidenced by increased transparency of the lung, depression and fixation of the diaphragm, shifting of the mediastinum away from the lesion, and increased excursion of the other leaflet of the diaphragm, may exist. In obstruction atelectasis, narrowing of the lung fields and shift of the mediastinal structures toward the affected side are cardinal signs. Lobar atelectasis, either of upper, middle or lower lobes, casts typical roentgenographic shadows (whose significance may not be recognized because of the compensatory enlargement of the rest of the lung). The importance of an analysis of the physical signs in obstruction atelectasis and of roentgen-ray examination in obstruction emphysema is stressed.—*Certain Aspects of the Diagnosis of Bronchostenosis, F. T. Lord, J. Thorac. Surg., August, 1932, i, 573.*—(*B. B.*)

Respiratory Stenosis and Function.—Artificial stenoses were produced in the afferent tube of the Knipping Respirator. The respiratory function was examined on healthy individuals breathing through such stenoses. Under this condition the minute volume is decreased on account of a decrease of the respiratory volume and of a decrease of respiratory frequency. The median and maximal second volumina are decreased, more during expiration than during inspiration. In maximal stenoses, the latter two volumina approach each other, and respiration becomes more even. The normal capacity is increased, with a concomitant increase of the reserve air and of the residual air. In other words, there is an acute overinsufflation of the lung, and the complementary air is decreased. Both maximal inspiration and maximal expiration are impaired.—*Einfluss der Stenosenatmung auf Lungenventilation und Lungenvolumina beim Gesunden, H. Lippelt, Beitr. z. Klin. d. Tuberk., November 1932, lxxxi, 520.*—(*M. P.*)

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